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December 1989

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RAINBOW

THE COLOR COMPUTER MONTHLY MAGAZINE

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Snow to Winter Graphics

Overview of MIDI

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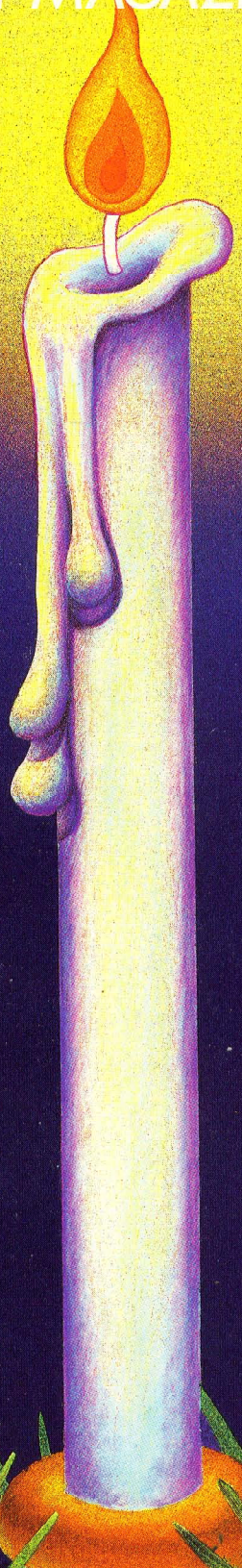

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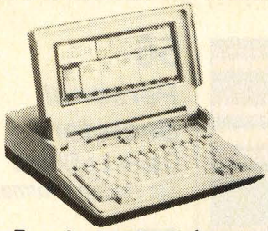

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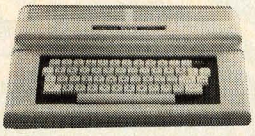

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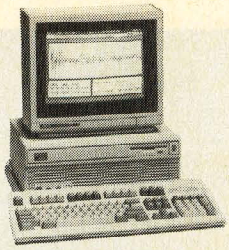

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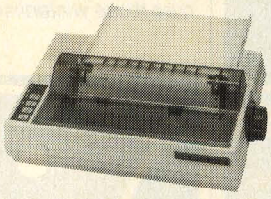

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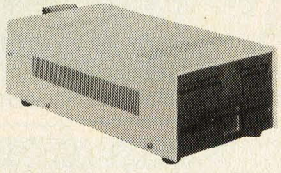

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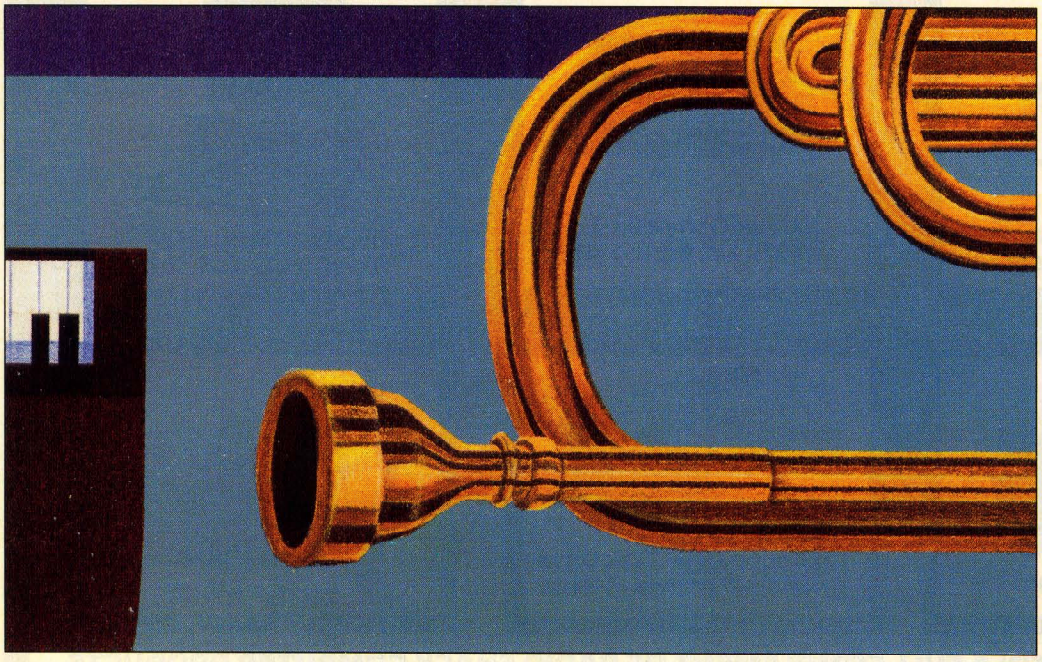

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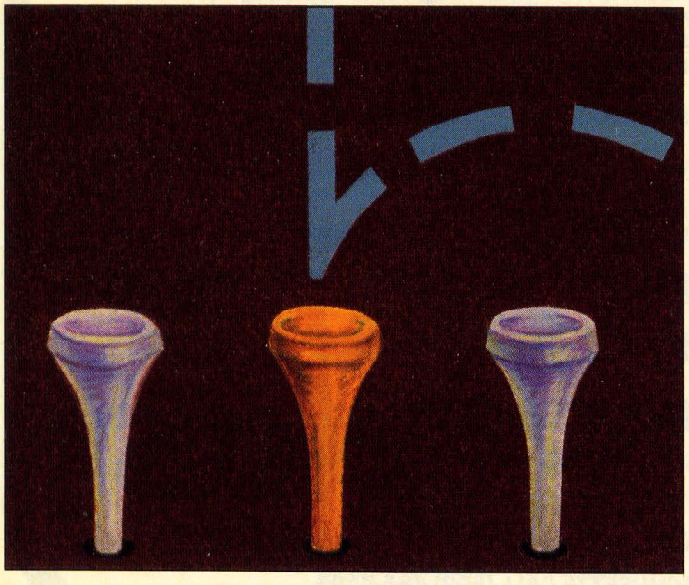

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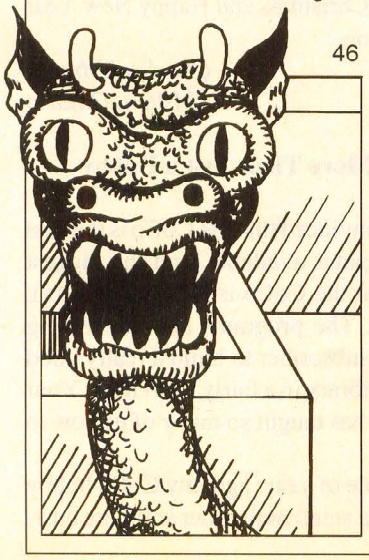

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Cover illustration by Heidi Nelson

Letters to the RAINBOW

Why Not OS-9?

Editor:

Over the years in THE RAINBOW I have noticed articles concerning the OS-9 operating system. Now that I am somewhat involved with this system, I think I can explain why it took me over five years to discover it.

A large part of the problem is the fact that there is such excellent RS-DOS software available and, on the whole, it is cheaper. Products like *VIP*, *TeleWriter* and *Simply Better* provide incredible features. While OS-9 is a flexible system and highly configurable, these products are largely configurable too. Most software bought for the CoCo is not transportable into an OS-9 environment, and most people simply say "why bother?" My conclusion is that there is not a real reluctance to get into OS-9, but rather, most users are not compelled to get into it.

Many arguments have been put forth regarding why one should seriously consider OS-9, but to that end the obvious multitasking, file security and system flexibility falls on deaf ears. From opposite sides RS-DOS seems archaic and OS-9 seems complicated.

I became involved with OS-9 when I purchased a second set of disk drives from someone who was selling his CoCo 3. Included with the purchase was OS-9 Level 2 Version 2.01 and some Tandy OS-9 software. I never would have bothered with OS-9 if not for this. Now I can't get enough of OS-9. The best advice I have for anyone even remotely interested in this software is to try it.

Looking back now, I can see why my attitude regarding the OS-9 articles was hostile. I had no relationship with the system. I would encounter an article about the shell or pipes or forking processes and say "No way am I even getting close to that. Who needs all this new terminology?"

Recently RAINBOW published a few very informative and easy-to-understand articles about the history of OS-9 as well as an overview of the system. Coincidentally I had my new disk drives and OS-9 ready to go at the time. Until I had a system to play with, the articles in "KISSable OS-9" were very esoteric. What is missing in THE RAINBOW is a series of articles on OS-9 similar to the assembly language tutorials.

I am still an OS-9 neophyte after a month of hacking for two to three hours a day. I consider all the time I have spent on OS-9 to be an investment. I believe my experiences are typical and a lot of OS-9 hostility is caused by a lack of knowledge. What I would like to accomplish with this letter is to offer your magazine a compelling reason to write a series of articles dealing with OS-9 basics.

Wayne Montague
Mississauga, Ontario

Dear Jeff Byers,

Editor:

The letter to RAINBOW from Jeff Byers of East Peoria, Illinois asked for some modem light definitions. My modem is an Everex Evercom 24e.

RI=Ring Indicator
TR=Terminal Ready
AN=Auto Answer
OH=Modem Off-hook
RD=Receive Data
SD=Send Data

Andrew Clark
Memphis, Tennessee

Too Big For Its Business

Editor:

I have a small business with a mailing list of about 500 names. Up till now I've been using *Elite File* for the mailing list and to print labels. It's getting to the point where it takes 10 minutes to add or subtract each name! Can you please recommend a more effective program for the CoCo 3 for up to 1000 names and addresses. Can I move all the current information to the new program?

J.K. Sinrod
16 Scranton Avenue
Lynbrook, N.Y. 11563

In Search of Celestial Software

Editor:

I am having trouble locating astronomy packages of the same sophistication as average astronomy packages for MS-DOS machines. Are you aware of any out of this world software for the CoCo?

Lynndel Humphreys
5121 Mortier Avenue
Orlando, FL 32812

Special Thanks

Editor:

Your magazine has many fine advertisers that support the CoCo and I have met many of them at the Chicago RAINBOWfest. I would, however, like to give a special thanks to two of them: T&D Software in Holland, Michigan and Microcom Software in Rochester, New York. Thanks for your friendly help, understanding and great interest in the CoCo.

Merry Christmas and Happy New Year to all of you.

Charley Urbanek
Milton, Ontario

It's More Than Just a Hobby

Editor:

I am convinced that the CoCo is the best little computer available, and the biggest reason that the CoCo is Number 1 is THE RAINBOW. The programs and advertising allow the subscriber to build a really good software library in a fairly short time. Your magazine has taught so many of us how to program.

A couple of years ago, my CoCo hobby grew into a small mail order software busi-

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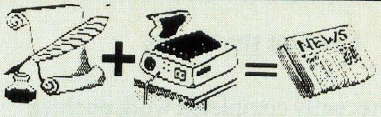
(See Details on Page 17)

CIII Pages



by Walter Bayer

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By Kevin Berner

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ness. This software business has made it possible for me to "meet" CoCo users from all over the U.S., Canada and other countries. It's a fantastic experience!

Jim Bennett
Poughkeepsie, New York

I've Got the Goods

Editor:

I have recently completed work on three arcade-type games for the Color Computer series. All programs are written in 100 percent assembly language with sound effects, demo modes and joystick options. They are integrated with attractive fireworks on the main menu, which is something to see in and of itself. I believe these products would go over well with your RAINBOW ON DISK subscribers. Is RAINBOW interested?

Patrick D. Grengs II
Rochesterm, Minnesota

We would like to consider your programs for publication. However, we must see them to make a proper evaluation. We welcome all submissions.

Running Out of Paper!

Editor:

I am developing a series of programs for my work and am using more and more paper. I need a better base of sources for paper and other materials, but THE RAINBOW tends to carry only ads from software companies — probably by choice of the companies.

Therefore I appeal to the readers and to supply companies for addresses and catalogs of materials. If I can get a substantial list of such suppliers, I'll certainly be willing to share this list for an SASE.

David B. Smith
P.O. Box 307
Grand Portage, MN 55605

Greek Listings

Editor:

I am a big fan of THE RAINBOW and look forward to each issue. I use the CoCo 3 mostly for word processing with *Word Power 3.2* and sign/card-making with *CoCo Graphics Designer Plus.*

I wish more of the magazine was devoted to reviews of equipment and software, rather than so many programs and games. I know that is why so many read the magazine but not me. I don't know where to begin with a page of printing that looks like this: `900 POKE 65496,0 :HSCREENO: RGB: END???`

I really enjoyed the review of the Star NX-1000 printer in the April '89 issue. It was a real bonus, however, I wish there were many more reviews of printers so some of us could make better choices. I also like the recent reviews of the word processing and graphics programs. They explained how each system worked so the consumer could make a better decision.

Kenneth C. Brownson
Newark, Delaware

Looking for MIDI

Editor:

I am looking for a MIDI program to run on the Color Computer 2 (by Tandy). I have a program called *Musica II* and am looking for the program called *CoCo MIDI*, which uses *Musica II* files to play a MIDI keyboard.

If you know of a source for this program, please write me.

Daniel Gutwein
105 Baltimore St.
Dayton, OH 45404

Refer to Page 74 of this issue for a detailed discussion of MIDI software for the Color Computer.

End This Myth!

Editor:

I don't understand. THE RAINBOW has printed requests for OS-9 articles. In a BITNET CoCo mailing list message, I saw a report from someone who called THE RAINBOW and was told the magazine was desperate for OS-9 articles. Then your magazine puts a title on a very good overview of OS-9 that continues its tradition of titles that pander to what Dale Puckett calls "the myth of OS-9 user hostility."

"OS-9 Survival Training?" Does someone at RAINBOW liken OS-9 something to a hurricane, war or other disaster, to the extent that it should require survival training? All software requires a learning period, and OS-9 is no exception. A potential user, though, could be persuaded that it's not worth trying if he hears the Big Lie often enough, and I'm ashamed of THE RAINBOW for perpetuating the myth with its choice of titles.

How does THE RAINBOW expect to encourage would-be writers and programmers on OS-9 topics?

James Jones
West Des Moines, Iowa

We see OS-9 as an area of great potential for Color Computer users. And we feel the chosen title accurately reflects the feelings of frustration and confusion reported by many OS-9 beginners and would-be users. When these people see a title such as "OS-9 Survival Training," they know they can expect an understanding source of guidance. And unless we missed the mark, that is exactly what the article represents.

Moving Right Along

Editor:

Every month I look forward to reading a new issue of your magazine because of its quality and content. The advertisers in THE RAINBOW are helpful and provide quick service, and like many readers find out, back issues are indispensable. Without them I would be lost. And last but not least, I used to be afraid of getting into OS-9, but the August '89 issue changed all of that thanks to the feature article written by Jeffrey S. Parker "OS-9 Survival Training" (pages 66-80). I went out and bought OS-9 Level II, *The Rainbow Guide to OS-9*, *The Rainbow Guide to OS-9 Level II*, and *The Official BASIC09 Tour Guide*. I am currently learning BASIC09 and plan to teach myself C using the OS-9 C Compiler and then buy the OS-9 Level II *Development System*. Without THE RAINBOW I would not be this far along. Thanks!

Perry M. Dueck
Rosenort, Manitoba

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

"... Just think of any word processing feature---chances are very likely that *Word Power* has it ... packs a lot of features ... excellent word processor..." --- **Rainbow's Word Processor Comparison Article** "*Deciding What's Right For You*" April 1989 Rainbow: Page 26.

Word Power 3.2

More Versatile • More Powerful With Spooler • Calculator • Split-Screen • 2-Column Printing

"*... friendly...amazing execution speed...much easier to use than VIP software & 2 other word processing systems I've tried...very user-friendly...massive text storage capacity ...highest among word processors...*" - **Rainbow Oct. 88 Review for Word Power**

Unparalleled Power packed in this 100% ML Word Processor written from scratch for the CoCo 3! **No other word processor offers such a wide array of features that are easy to learn & use.**

DISPLAY & SPEED

Word Power 3.2 runs at double-clock speed and uses the **true 80-column display** with lowercase instead of the graphics screen. The result is lightning fast screen reformatting and added speed! **All prompts are displayed in plain English in neat colored windows.** The current column number, line number, page number, percentage of free memory is displayed at all times. Even the **page break** is displayed so you know where one page ends and the other begins. The Setup program allows you to change fore/background colors as well as (in)visible carriage returns. Word Power 3.2 can be used with RGB/Composite/Monochrome monitors as well as TV.

MAXIMUM MEMORY

Word Power 3.2 gives you **over 72K** on 128K and **over 450K** on 512K CoCo 3 for Text Storage - more memory than any other CoCo word-processor. Period.

EFFORTLESS EDITING

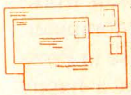
Word Power 3.2 has one of the **most powerful and user-friendly full-screen editor with word-wrap.** All you do is type. Word Power takes care of the text arrangement. The unique **Auto-Save** feature saves text to disk at regular intervals for peace of mind.

Insert/Overstrike Mode (Cursor Style Changes to indicate mode);OOPS Recall during delete;Type-ahead Buffer for fast typers;Key-Repeat (adjustable); Key-Click; 4-way cursor and scrolling; Cursor to beginning/end of text, beginning/end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, to beginning/end of line, complete line, text before/after cursor; Locate/Replace with Wild-Card Search with auto/manual replace; Block Mark, Unmark, Copy, Move & Delete; Line Positioning (Center/Right Justified); Set/Reset 120 programmable tab stops; Word-Count; Define Top/Bottom/Left/Right margins & page length. You can also highlight text (underline-with on-screen underlining, bold, italics, superscripts, etc.). Word Power even has a **HELP** screen which an be accessed any time during edit.

SPLIT-SCREEN EDITING

Splits the screen in half so you can view one portion of your text while you edit another. You'll love it!

MAIL-MERGE



Ever try mailing out the same letter to 50 different people? Could be quite a chore. Not with Word Power 3.2! Using this feature, you can type a letter, follow it with a list of addresses and have Word Power print out personalized letters. It's that easy!

CALCULATOR

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SAVING/LOADING TEXT

Word Power 3.2 creates ASCII format files which are compatible with almost all terminal/spell-checking & other word-processing programs. Allows you to Display Free Space, Load, Save, Append & Kill files. The ARE YOU SURE? prompt prevents accidental overwriting & deletion. You can select files by simply cursoring through the disk directory. Supports double-sided drives & step-rates.

PRINTING

Word Power 3.2 drives almost any printer (DMP, EPSON, GEMINI, OKIDATA, etc). Allows options such as baud rates, line spacing, page/print pause, partial print, page numbering/placement, linefeeds, multi-line headers/footers, right justification & number of copies. The values of these parameters & margins can be changed anytime in the text by embedding Printer Option Codes. The **WHAT YOU SEE IS WHAT YOU GET** feature allows you to preview the text on the screen as it will appear in print. You can view margins, page breaks, justification & more.

PRINT SPOOLER

Why buy a hardware Print Spooler? Word Power 3.2 has a **built-in Spooler** which allows you to simultaneously edit one document & print another.

TWO-COLUMN PRINTING

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SPELLING CHECKER

Word Power 3.2 comes with spelling checker/dictionary which finds & corrects mistakes in your text. You can add words to /delete words from dictionary.

PUNCTUATION CHECKER

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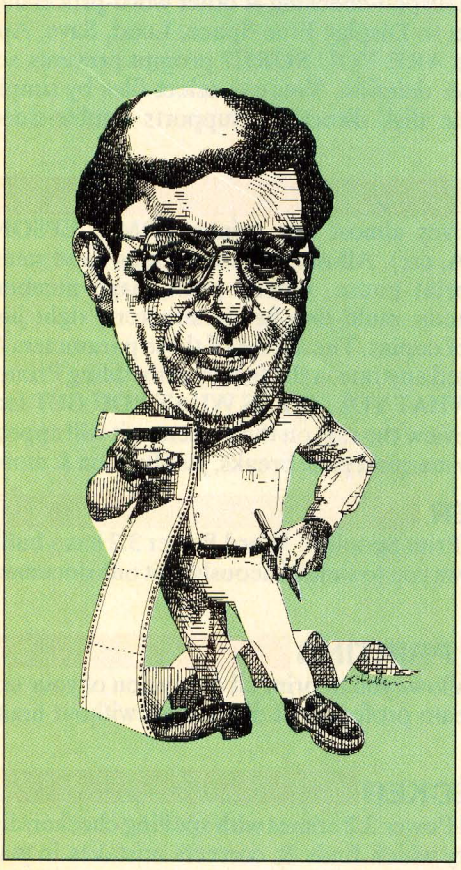

Tandy's Director of Market Planning, Ed Juge, was by our office the other day for a visit and, as always, it was a pleasure having him. That evening Ed and I went out for some informal talk and a good meal.

Other than store personnel, Ed is the first person from Radio Shack/Tandy that I met in person. We used to chat about the Color Computer, its future, what Tandy was doing about it, and so forth. Things have not changed a great deal in that regard.

The $64,000 question, as always, is, "What is being done about the CoCo?" Ed, the major-domo of public relations for Tandy, confirms what other sources have been telling me for some time.

Despite what you may or may not hear, the status of our favorite computer is very much the same as it has been throughout its existence; if it sells, Tandy will continue to manufacture it. Interestingly, there has never been a holiday season in which the CoCo has not sold well.

I tell you this now because I believe, as I have for many years, that you can comfortably encourage your friends and associates to buy a CoCo this holiday season. Actually I encourage you to do so. The reason is that I expect the Color Computer to be with us for quite a while. Even when it is no longer formally sold, you will be able to get hardware, software, repairs and support from Tandy as well as the many third-party suppliers who advertise in these pages.

The CoCo is still a powerful machine today. No, you cannot do all the things on a Color Computer that you can do on, say, a microchannel, 80386-based Tandy 5000. But you do not have to shell out $9,000 either. Heck, I walked into a "wholesale" office supply in Louisville this last weekend and saw a personal word processor for $800. It was nice but frankly, why buy one when you can have a computer instead? It just doesn't make sense to me.

The other aspect of the CoCo market I think we need to consider is something mentioned now and again (although not too forcefully), by Tandy: Ninetendo games on cartridges for the Color Computer are showing up in Radio Shack's line for this fall. My sources say that what you see in the catalog is not all there is.

A game machine? Perish the thought! But games have, in my opinion, interested more people in computers than anything else.

Yes, Apple Computer Company made giant strides when it developed ads that showed something new — an electronic spreadsheet named *VisiCalc* — to attract business clients. But for every business person *VisiCalc*ing away, there were probably 10 (including that same person) playing *Space Invaders*. Because Tandy is looking at a line of such programs on ROM paks, I believe there are plans for the CoCo.

* * * * *

By the way, never doubt the power of the consumer. There is an interesting story I picked up on the InterTAN/Canada decision to drop the CoCo (this, by the way, does not come from Juge).

When we learned about InterTAN's plans, we urged all our Canadian subscribers to write InterTAN and give their addresses. Many of you did. From outward appearances InterTAN didn't do anything about it — but that is not the case.

So overwhelming was the reaction in Canada that InterTAN went to the factory where the Color Computers are produced and ordered more with the intention of re-introducing them into the line this fall.

The problem was by that time the factory had finished its production run for the other markets. The relatively small number InterTAN needed would have made the cost prohibitive to sell at retail, especially compared with the cost of the same computer in the United States.

That, plus the fact that InterTAN's order came while RAM cost was at one of its highest points, forced the company not to re-establish the CoCo.

But here is an idea: When the order goes in to build more CoCos for next year, InterTAN can piggyback that order. If you wrote them before, why not do it again? If you did not write before, now may be a good time. Here's the address: 279 Bayview Drive, Barrie, ON, L4M 4W5, Canada.

* * * * *

Our RAINBOW family will be enjoying the holidays with you again this year. We look forward to many long years of working with you and our favorite computer. With that in mind, from our house in Prospect to yours, let me wish you a happy holiday.

—Lonnie Falk

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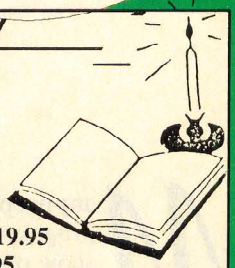

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Let it snow, let it snow, let it snow

Winter Magic

by John H. Mosley

Many people who type in a program that makes snow often find that all they get is a screen slowly filling up with dots. That's why I wrote *Winter Magic* for the CoCo 3.

Type in Listing 3 and save it to disk or cassette before running it. After you run the program, the computer asks whether you are using a composite or RGB monitor. Then a scene with clouds, trees and a stream forms. After about ten seconds snow starts to fall. The snow looks quite realistic because different snowflakes are designed to fall at different speeds.

How It Works

Listing 1 is the machine language subroutine that actually makes the snow fall. It reads values from a table (located from $1000 to $14FF), sets the background color (erases a flake), updates the table and sets the snowflake at its new location. Listing 2 is a subroutine to store the background colors in the table the first time. You have to execute this subroutine only once before making snow.

The start, end and execute addresses for Listing 1 are $0F00, $0F56 and $0F00, respectively. For Listing 2 they are $0F80, $0FBB and $0F80. The table is located from address $1000 to $14FF. It is incremented in steps of four, starting from $1000: The first value is the vertical position of the snowflake (x); the second value (x+1) is the horizontal position; the third (x+2) is the increment; and the fourth is the background color (x+3). Look at lines 160 to 260 of Listing 3 to see what I mean. Horizontal values from 80 to 175 are invalid. Values of 0 to 79 correspond to columns 0 to 79, while values 176 to 255 correspond to columns 80 to 159.

This program creates snowflakes two pixels (dots) wide so you don't have to break bytes down into bits. This results in 160 columns across the screen. You can create snow on any of the HSCREEN graphics screens (HSCREEN 1 through 4), but the snowflake size remains about the same width because even though you double the resolution, you also double the number of pixels stored in one byte.

You can use any value from 0 to 255 for the vertical position because the subroutine doesn't check to see if the snow has reached the bottom of the screen (past Line 191). The result is smoother and faster falling snow, but you can't HGET or HPUT anything because the snow runs over into the HGET/HPUT buffer area — not a major problem since HPUTting anything on top of falling snow looks strange anyway. Listing 1 can be altered to test the vertical position and change it to 0 if it goes past Line 191.

There are a few things to know if you customize your snowfall by editing lines 160 through 260. If you have two snowflakes in the same vertical line, and they have different increments, you will probably get a streak. (A streak is a vertical line of snow constantly building upon itself and getting longer.) You can have two or more snowflakes lined up vertically (*Winter Magic* does just this) if you keep them separated by one more than their increment and give both of them the same increment. Line 180 ensures that they have the same increment, and lines 200 and 240 keep them separated.

If you decide to customize the snowfall, don't forget to EXEC &HF80 before starting the snowfall (Line 270). This stores the background colors in the table. More adventurous people may want to change the table length (and the number of flakes), but this is really tricky and requires a lot of experimenting. The end-table address is stored at $0F13/$0F14 and $0F93/$0F94. If all you want is full-screen snow, it is probably easiest to leave lines 160 through 260 the way they are and just delete lines 300 through 480. Then put in whatever you want to create your own scene.

If you install your own scene, you may want to put in the following line:

```
FORT=0 TO 15:PALETTE T,0:NEXT T
```

This hangs all the colors so you can't see the scene being drawn. Line 280 restores the colors before making the snow. The snow is always Color 0, and the color values are stored in Line 590 (the first 16 are composite, the second 16 are RGB). Since the two ML subroutines and table are

John Mosley attends Portland High School and enjoys music and programming on the CoCo 3. He can be contacted at 420 Main Street, Portland, CT 06480.

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stored in Lo-Res graphics memory, you can't use the PMODE graphics screens.

This program is useful for creating snow on *CoCo Max III* pictures too. (Color 0 on *CoCo Max III* is white.) Or you can insert your own graphics. So whether it snows or not, you can still have a white Christmas! ❑

CoCo 3

Listing 1: SNOW

```
00000                          COPYRIGHT 1989 FALSOFT, INC
00100 START   LDX     #$1000   START OF TABLE
00110 LOOP1   LDB     #160     NUMBER OF VERTICAL LINES
00120         LDA     ,X       GET VERTICAL POSITION
00130         MUL              MULTIPLY THEM
00140         TFR     D,Y      TRANSFER TO Y REGISTER
00150         LEAY    +$4000,Y ADD &H4000 TO GET SCREEN ADDRESS
00160         LDA     +1,X     GET HORIZONTAL POSITION
00170         LEAY    A,Y      ADD HORIZONTAL POSITION
00180         CMPX    #$1500   AT END OF TABLE?
00190         BEQ     STOP     BRANCH TO END ROUTINE IF AT END
00200         BSR     ADJUST   ADJUST Y REGISTER TO ACCESS SCREEN
00210         LDA     +3,X     LOAD BACKGROUND COLOR
00220         STA     ,Y       SET BACKGROUND COLOR ON SCREEN
00230         LDA     ,X       LOAD VERTICAL POSITION
00240         ADDA    +2,X     ADD INCREMENT TO VERTICAL POSITION
00270         STA     ,X       STORE UPDATED VERTICAL POSITION
00280         LDB     #160     LOAD NUMBER OF VERTICAL LINES
00290         MUL              MULTIPLY BY VERTICAL POSITION
00300         TFR     D,Y      TRANSFER TO Y REGISTER
00310         LEAY    +$4000,Y ADD &H4000 TO GET ADDRESS
00320         LDA     +1,X     LOAD HORIZONTAL POSITION
00330         LEAY    A,Y      ADD TO ADDRESS
00340         BSR     ADJUST   BRANCH TO ADDRESS ADJUSTMENT ROUTINE
00350         LDA     .Y       LOAD BACKGROUND COLOR FROM SCREEN
00360         STA     +3,X     STORE BACKGROUND COLOR IN TABLE
00370         CLR     ,Y       CLEAR POSITION TO COLOR 0
00380         LEAX    +4,X     INCREMENT TABLE POINTER
00390         BRA     LOOP1    GO BACK AND DO NEXT ELEMENT IN TABLE
00400 ADJUST  LDB     #$30     FIRST GRAPHICS PAGE
00410 LOOP2   CMPY    #$6000   IS Y ADDRESS PAST END OF PAGE?
00420         BMI     RETURN   IF NOT RETURN TO MAIN PART OF PROGRAM
00430         INCB             INCREMENT TO NEXT PAGE
00440         LEAY    -$2000,Y DECREASE Y ADDRESS BY &H2000
00450         BRA     LOOP2    LOOP BACK AND TEST FOR PAST AGAIN
00460 RETURN  STB     $FFA2    STORE PAGE IN ADDRESS &HFFA2
00470         RTS              RETURN TO MAIN PART OF PROGRAM
00500 STOP    LDA     #$7A     LOAD A WITH PROPER PAGE TO RESTORE
00510         STA     $FFA2    STORE PAGE IN ADDRESS &HFFA2
00520 END     RTS              RETURN TO BASIC
00530         END              END OF PROGRAM
```

Listing 2: BACKGRND

```
00000                          COPYRIGHT 1989 FALSOFT, INC
00100 START   LDX     #$1000   LOAD START OF TABLE
00110 LOOP    LDB     #160     NUMBER OF VERTICAL LINES
00120         LDA     ,X       LOAD VERTICAL POSITION
00130         MUL              MULTIPLY 160 X VERTICAL POSITION
00140         TFR     D,Y      TRANSFER ANSWER TO Y REGISTER
00150         LEAY    +$4000,Y ADD &H4000 TO ANSWER
00160         LDA     +1,X     LOAD HORIZONTAL POSITION
00170         LEAY    A,Y      ADD TO ADDRESS (Y REGISTER)
00180         CMPX    #$1500   AT END OF TABLE?
00190         BEQ     STOP     BRANCH TO ENDING ROUTINE IF SO
00200         BSR     ADJUST   BRANCH TO ADJUST SUBROUTINE
00210         LDA     .Y       GET BACKGROUND COLOR
00220         STA     +3,X     STORE IN TABLE
00230         LEAX    +4,X     INCREMENT TABLE
00240         BRA     LOOP     GO BACK AND DO AGAIN
00250 ADJUST  LDB     #$30     LOAD SCREEN PAGE
00260 LOOP2   CMPY    #$6000   AT END OF PAGE?
00270         BMI     RETURN   IF NOT GO BACK TO MAIN PROGRAM
00280         INCB             INCREMENT PAGE
00290         LEAY    -$2000,Y DECREASE ADDRESS
00300         BRA     LOOP2    BRANCH BACK AND TEST AGAIN
00310 RETURN  STB     $FFA2    STORE PAGE AT ADDRESS &HFFA2
00320         RTS              GO BACK TO MAIN BODY OF PROGRAM
00330 STOP    LDA     #$7A     LOAD OLD PAGE NUMBER
00340         STA     $FFA2    STORE IT AT ADDRESS &HFFA2
00350 END     RTS              RETURN TO BASIC
00360         END              END OF PROGRAM
```

```
90 ..... 73
170 ..... 24
250 ..... 214
320 ..... 73
360 ..... 200
400 ..... 137
440 ..... 199
480 ..... 49
END ..... 186
```

Listing 3: MAGIC

```
0 ' COPYRIGHT 1989 FALSOFT, INC
10 ' WINTER MAGIC
20 ' COPYRIGHT 1989
30 ' BY JOHN H. MOSLEY
40 POKE65497,0:PCLEAR4:CLEAR3000
50 PALETTE12,0:PALETTE13,18
60 FORT=&HF00 TO &HF56:READ A$:A
$="&H"+A$:POKET,VAL(A$):NEXTT
70 DATA 8E,10,00,C6,A0,A6,84,3D.
1F,02,31,A9,40,00,A6,01,31,A6,8C
,15,00,27,38,8D,23,A6,03,A7,A4,A
6,84,AB,02,A7,84,C6,A0,3D.1F,02.
31,A9,40,00,A6,01,31,A6,8D,0A,A6
,A4,A7,03,6F,A4
80 DATA 30,04,20,C7,C6,30,10,8C,
60,00,2B,07,5C,31,A9,E0,00,20,F3
,F7,FF,A2,39,86,/A,B7,FF,A2,39,0
0,00
90 FORT=&HF80 TO &HFBB:READ A$:A
$="&H"+A$:POKET,VAL(A$):NEXTT
100 DATA 8E,10,00,C6,A0,A6,84,3D
.1F,02,31,A9,40,00,A6,01,31,A6,8
C,15,00,27,1D,8D,08,A6,A4,A7,03,
30,04,20,E2,C6,30,10,8C,60,00,2B
,07,5C,31,A9,E0,00,20,F3,F7,FF,A
2,39,86,7A,B7,FF,A2,39,00,00
110 CLS:INPUT"      MONIOR TYPE:
                    (1)-COMPOSIT
E                   (2)-RGB
                    ---> ";A$
120 IF A$="1" THEN M=0
130 IF A$="2" THEN M=1
140 IF A$<>"1" AND A$<>"2" THEN
SOUND100,3:GOTO 110
150 GOSUB 580:FORT=0 TO 15:PALET
TET,C(T):NEXTT:GOSUB300
160 X=0:FORT=&H1000 TO &H113C ST
EP 4:POKET,RND(256)-1:POKET+1,X:
X=X+1:NEXTT
170 X=176:FORT=&H1140 TO &H127C
STEP 4:POKET,RND(256)-1:POKET+1,
X:X=X+1:NEXTT
180 FORT=&H1002 TO &H127E STEP 2
0:POKET,2:POKET+&H280,2:POKET+4,
4:POKET+&H284,4:POKET+8,1:POKET+
&H288,1:POKET+12,3:POKET+&H28C,3
:POKET+16,5:POKET+&H290,5:NEXTT
190 X=0:FORT=&H1280 TO &H13BC ST
EP 4:POKET+1,X
200 D=PEEK(T-&H280):E=D+128:IFE>
255 THEN E=E-256
210 POKET,E
220 X=X+1:NEXTT
230 X=176:FORT=&H13C0 TO &H14FC
STEP 4:POKET+1,X
```

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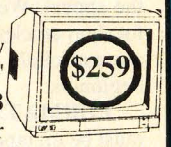

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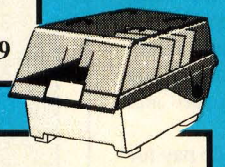

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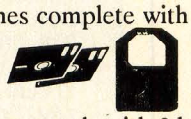

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FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

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Please do not submit material currently submitted to another publication.

```
240 D=PEEK(T-&H280):E=D+128:IFE>
255 THEN E=E-256
250 POKET,E
260 X=X+1:NEXTT
270 EXEC&HF80
280 FORT=0 TO 15:PALETTET,C(T):N
EXTT
290 EXEC&HF00:GOTO 290
300 HSCREEN2:HCLS 5:GOSUB 500:HD
RAW"C0BM0,84R9ER9ER15ER33FR29FR9
FR12FR9FR16FR15FR25FR10ER16ER19E
R9ER16ER12ER21ER40":HPAINT(300,1
91),0,0
310 C$="C13U4RD4RU4RND4UC7RER6ER
3ERER2EH6LH3LH3UDF3NL6RFR4ER2E2L
2HLH2LHUH2L2HL2HFR2FR4ERE3LH6UHU
NH5R3EH5UHUH2UH2UHGDGDG5LG3LGLGR
2FRF2R4NEL4HG4LG3FR3FR3NE4DG5LG2
L2F2R2FR3FR2FR2L2HL2GDG2LGLGLGLG
L2FRFRFRFR2FR2FR3FR9BU5BL17RE2UE
UE"
320 E$="L2H3LHUH2UBU3BL3E2U2EU3E
U2BR5BDH2UHUHUHU2BU4BLE2UEU2":HD
RAW"BM234,162;"+C$:HDRAW"BM244,1
51;"+E$:HPAINT(240,120),8,7:HDRA
W"C14;BM242,166LH2BL2BD4L6BH2RE2
BR3D2":HDRAW"BM169,124RE3BR9FRFR
BG2BDL3GL5HLBE2UBE2BR2FDFBD20BRL
3GL2GLGLG2LGLGLG2LG3LG5"
330 HDRAW"BM139,113L4GL2GLGL5GLG
LGLG2LG4LGDBU26BL13LGL2G2LG2LGLG
LG2LG":HDRAW"BM75,144R9FR3FR2FR4
FR4FR3BD23BL10R9FR3FR2FR5FR4FR2"
:HDRAW"BM12,89D7BR31BDEUE3UBD25B
R7LGLGLGLG2LG3D":HDRAW"BM15,115U
2EUEUE2"
340 HDRAW"BM0,99R37FR3FRF2RFRFRF
R2FR3FRFR2FRFR2FRFRFRF2RFRFRFRFR
FRFRFRF2RFR2F2R2FRFRFRF2RFRF4RF4
DF5RF2DF9D2FDF3RFRFRFRF4RF3RF9RF
9"
350 HDRAW"BM0,102R15FR12FR4FRF2R
FR2F2R3FRFR3FRFR3F2RFR2FRFRFRFRF
R2F2R2F2RFR2F3RF2RFRFRF3RFRFD2F2
DF4DF4RF4DF5DF4DF2DF3DF3DF3DF4DF
9":HPAINT(1,100),3,14
360 HDRAW"C12BM175,120R5U17EU5EU
2EU3EUEUE2UE4RER6FR3F6LU2EUL2H2E
R3UL7HL2UE5UG5UGDL2GL3GL2U2LD2GD
G3DGDGD2L2U30EU4EUE6REUE2RERER2E
R2ER2ER16ER4FHL8HL13GL2GL2GL2GLG
LU3GD2LDGLDGLG4DGLU22E2U3E6LGL2D
RGLDLDLHU2HU7HU2LD11L3FRDFD27LH2
UH4LHL2FR2"
370 HDRAW"BM168,41DRDRDRDRD2FDFD
FD4FD30U3LHUH2UH4UHUHGH2LHL9GL5G
2LG3DGRURURURUR3ULER6UNR11DR11D2
LDR2F4DFDF2DFDFD2FD2FD27":HPAINT
(178,110),12,12
380 HDRAW"C4BM20,101;R8BR7R2FRFR
FR2FBD4BR6R2FR2FRFBR5R2FRF2RBD2R
FRFR2FBD3BR8RF2RFR2F2RBR11BD9F3R
F7BU3BR3FDFRF8DF2DFDBL4BD4F10DF4
BU4BR3RF11DF4"
390 H$="C14E2BR5RFBL4BDU2BU2BL2C
13U3RD3RU3RND3UC7R7ER5ER2H2LH2LH
7UFRFR2FR3H8UHU2NL4RFR4H6UHUH2U2
HGDG3DG6LG2DNLR7EREGLGLG2DG6LGFR
5NE3G6L2GR3F2R3FR18":HDRAW"BM284
,100;"+H$:D$="DFDFBD7BL3DGDGDGDB
R5BUDFDF2RF3BL9BU2DG3BU6BL4DG2LG
"
400 HDRAW"C12BM189,74;U5HUH2F2DF
RU6EGD11U3E3U3E2G2D2R2ER":HDRAW"
BM206,62;D4GD3ER3E":HDRAW"BM210,
76;E2UEU2EUEU6EU3D3GD5EUE6":HDRA
W"BM210,78;R3HR10FRFHLHL8URER2E1
0REGLG7R2ER4ER2":HDRAW"BM210,81;
DRDR6EGL6DF4DF":HDRAW"BM209,86D4
GD3U3EU4RF3DF2DFDF"
410 HDRAW"BM30,150;"+H$:HDRAW"BM
80,180;"+C$:HDRAW"BM34,112;"+D$:
HDRAW"BM90,169;"+E$:HPAINT(36,12
0),8,7:HPAINT(86,150),8,7:HDRAW"
BM288,62;"+D$:HPAINT(290,70),8,7
:HDRAW"C14BM78,182;G2LRBF2LR7BE2
BR2LH2BL4D2"
420 HDRAW"BM90,95;"+H$:HDRAW"BM9
4,57;"+D$:HPAINT(96,65),8,7:HDRA
W"BM296,146;"+H$:HDRAW"BM300,108
;"+D$:HPAINT(302,116),8,7
430 HDRAW"C12BM190,44R3UR6UR4EGL
4DFR2F":HDRAW"BM192,36U2RU9EU2D2
GD5RU2EUEUER5FHL4E2RE":HDRAW"BM2
04,34RUEUEUEUEUEU3EU3D3GRE2R3L3G
2LD5UERERER2":HDRAW"BM207,29R2ER
2ER2E":HDRAW"BM216,33R3UR6FRFRLH
LHL3URE3":HDRAW"BM217,37R3FRFDF3
H3UHUNL3R3F2R3NF3E3U"
440 HDRAW"BM205,29U2HUH":HDRAW"B
M207,37R3FRFD4FD4U4HU4F6R2FR5L5H
L2FDFDF":HDRAW"BM189,16NLNHU3EU3
ENU6E2RERE":HDRAW"BM189,15;R6DNR
5UERERF4U"
450 HDRAW"BM183,17U4H2F2RE2UE":H
DRAW"BM179,10U2EU2NE3DR2F2":HDRA
W"BM177,6U5E":HDRAW"BM175,6UH2LH
":HDRAW"BM170,5D5FD2FD3RLHL2UL4G
ER4UH2U2HNU3L2G2":HDRAW"BM175,39
UHNU5H2LH"
460 HDRAW"BM164,41L2GLDNL4G3DG":
HDRAW"BM171,47L3GL2":HDRAW"BM169
,40U2HU9EUEUDGDGLDUHUH2U":HDRAW"
BM165,39LULULULDU3HU5EUEGDGD3LUH
U7EGD6H3LHL":HDRAW"BM161,36L2HL3
GL2G3DG2E2UE3R2E2RL6HUHUHUHFDFDF
DL5UH2UHUHFDFDF2DL3GL2G2"
470 HDRAW"BM166,70ULU2LU15FGD11L
U2H2UH2U":HDRAW"BM161,73L3GLGNL4
DG2L":HDRAW"BM160,68H4NU5H3UH2":
HDRAW"BM154,68L7EL3ENL10L3ULH4UD
F4RFENU5U2H2U2HU2H"
480 HDRAW"BM139,75L12GL2GER2ER6U
H3UH2F2DF3D2LGL2G2":HDRAW"BM145,
74D4LD2GD3U3EU2RFD3FD2":HDRAW"BM
138,78D2GDGDFDUHUEUEUG4NL5G2D2G"
490 RETURN
500 HCOLOR6:FORT=0 TO 90 STEP .4
5:A=900-T*10
510 X=RND(640+A)-(160+A/2):Y=RND
(640+A)-(160+A/2)
520 IF X<0 THEN X=0
530 IF X>319 THEN X=319
540 IF Y<0 THEN Y=0
550 IF Y>319 THEN Y=319
560 HLINE(X,T)-(Y,T),PSET:NEXTT
570 RETURN
580 DIMC(32):FORT=0 TO 31:READ C
(T):NEXTT
590 DATA 63,7,9,11,28,60,32,1,17
,33,37,52,5,20,16,0,63,36,45,9,2
5,59,56,2,16,18,52,54,34,48,7,0
600 FORT=0 TO 15:C(T)=C(T+M*16):
NEXTT
610 RETURN
```

BIG BASIC

Full Power for your CoCo 3!

(From Danosoft)

Gives up to 92K User Memory in 128K CoCo and 476K in 512K CoCo from BASIC with any mix of program/variables. You can have one BIG program or 58 Separate ones running at once from computer memory in multiple windows! Big Basic also allows you to Disk Chain any size program. Step up to the full potential of your CoCo 3 with Big Basic. Only **$39.95**

KEYBOARDS, ETC...

Keyboard Extension Cable allows you to move your keyboard away from the computer & type with ease. Use your existing keyboard or leave your present keyboard intact and use a second keyboard. Only **$39.95**

CoCo 3 Keyboard: $39.95 w/ Extension Cable: **$69.95**

CoCo 2 Keyboard: $19.95 w/ Extension Cable: **$49.95**

(CoCo 3 Keyboard includes free Function Keys Software)

512K Upgrades

Fully assembled, tested and ready to be shipped NOW! Our design allows mounting chips on top to prevent any heating problems. No soldering; Easy instructions for 2 minute installation! Comes with following software (value $100):

- 512K Ramtest
- 512K Backup Lightning
- 512K Print Spooler
- 512K Ramdisk
- OS9 Level II Ramdisk

Only **$99**

The absolute best 512K Upgrade Package Available!

90 day warranty! **New Low Price** ~~$129~~

0K Upgrade Board (with 512K Ramtest/Ramdisk/Spooler): **$39.95**

Upgrades for CoCo 2

64K Upgrade (8 chip) for CoCo I, CoCo II's with Cat # 26-3026/3027/3134/3136: **$29.95**

64K Upgrade (2 chip) for 26-3134 A/B CoCo II: **$39.95**

(Free 64K Software included with 64K Upgrades)

EPROM ...

INTRONICS EPROM PROGRAMMER: Programs 2516 to 27010 & more! Includes software & complete documentation. Latest version. Lowest Price Anywhere. CoCo 1,2,3. Only **$137.95**

DATARASE Eprom Eraser: For 24/28 pin Eproms. Erases up to 4 EPROMs at a time. Only **$49.95**

Both Eprom Programmer & Eraser: $179.95 Datarase II

2764 Eprom: $8 **27128 Eprom: $9**

ROMPAK (w/ Blank PC Board, 27xx Series): $12.95

BLANK CARTRIDGE (Disk Controller Size): $10.95

CABLES, Etc.

Magnavox 8505/8515/8CM643 Analog RGB Cable: $24.95

Serial-to-Parallel Interface: Use your parallel printer at high speed (300-9600 baud) with the CoCo. Comes with all cables. No software compatibility problems. Only **$44.95**

15" Shielded Multipak Extension Cable: $36.95

Y Cable: Use your disk system with Speech/RS232 Pack, DS69 Digitizer, etc. Only **$27.95**

RGB Analog Extender Cable: $19.95

SONY Monitor Cable: $29.95

MODEM Cable: 4 pin to DB25. Only **$19.95**

2 Position Switcher: Hook 2 devices to serial port. **$29.95**

HI-RES Joystick Interface: $11.99

COMMUNICATIONS EXTRAVAGANZA

(1) **Avatex 1200e Modem:** Fully Hayes Compatible 300/1200 w speaker, Auto Dial/Answer/Redial.

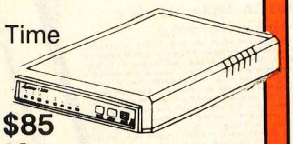
(2) **MODEM CABLE** (4pin to DB25; Reg $19.95)

(3) **Autoterm** Software (Reg $39.95)

(4) Free Compuserve Offer & Access Time

(5) **UPS 2nd Day Air Shipping**

Only **$129.95**



Avatex 1200e Modem Only : $85

Zoom 2400 Modem Only: $149

Communications Extravaganza 2400: Includes Zoom 2400 baud modem, cable, software & 2nd Day Air Shipping. Only **$189.95**

All our modems carry a 2 Year Warranty!

CHIPS, Etc.

Genuine RS Disk Rom 1.1 (Needed for CoCo 3): **$29.95**

ECB Rom 1.1: $29.95

68B09E Chip: $14.95 **68B21 Chip: $5.95**

GIME Chip for CoCo 3:**$39.95**

Genuine RS Multipak PAL Chip (Specify 26-3024 / 26-3124): **$19.95**

PAL Switcher: Allows you to switch between CoCo 2 & 3 modes when using the Multipak. You need the OLDER & NEW PAL Chip for the 26-3024 Multipak. Only **$39.95.** With NEW PAL Chip Only **$49.95**

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To Order: All Orders $75 and above (except Printers, Monitors, Drives, Computers) shipped by **UPS 2nd Day Air** at no extra charge in Continental US. All orders $150 or above and Word Power 3.2 orders will receive a free **T-Shirt till Dec 31, 1989.!** We accept Visa, MC, Amex, Discover, Check, MO & School PO's. Please add $3.00 S&H ($10 for Drives) in Continental US; all others add 10% S&H (Min $5). NYS Residents please add sales tax. Our Australian Agent: Australian Peripheral Development. Ph: 07-341-9061.

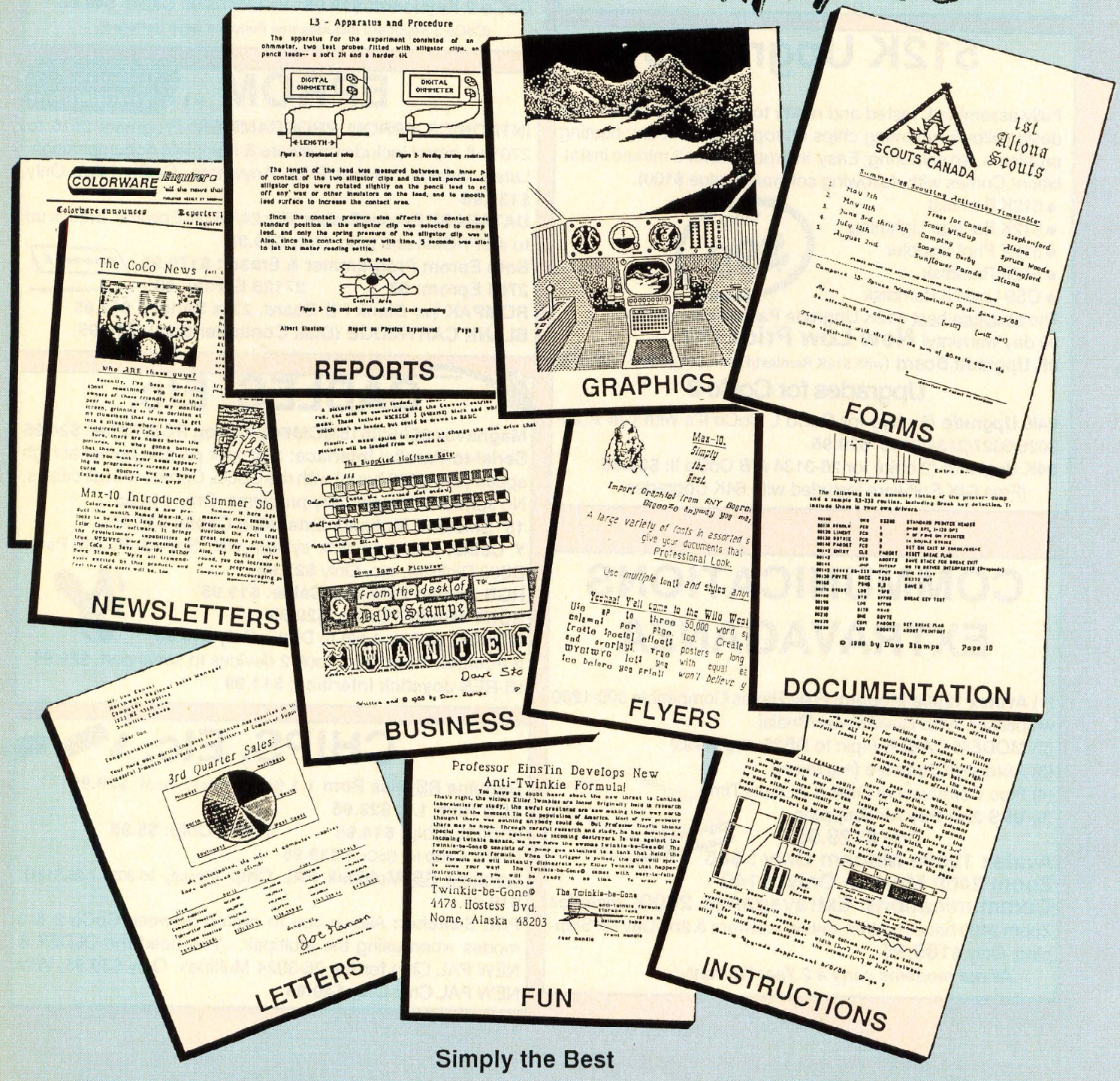
Credit Card Toll Free Orderline: **1-800-654-5244** (9AM-8PM 7 Days/week)

Tech. Info (Between 4-8pm), Order Status, Info: 716-383-8830. Fax: 716-383-0026.

UPS 2ND DAY AIR

THE MAX SYSTEM....

with CoCo Max™ and Max-10™



Simply the Best

Alone, they're simply amazing. Together these two make an unbeatable team. CoCo Max III and Max-10: there's strength in numbers. Thousands of Color Computer enthusiasts the world over agree: this must be seen to be believed. CoCo Max has been used to draw so many pictures in Rainbow magazine that we've lost count of them all. And Max-10 is just the tool to write the thousand words that you know your CoCo Max picture is worth.

COLORWARE

Have a Super CoCo Christmas !

With these great bargains:

Max-10™
The Dazzling Word Processor
$79.95 now $39.95

Max-10: the Rolls-Royce of word processors. The only one with true graphic capability and dozens of type styles. Using your dot matrix printer you get from tiny footnotes (6 point) to big titles (24 point).

The *Rainbow* review (1/89) said: **"An incredible job of providing power, flexibility and speed in a program that is as easy to use as it is to pronounce! ... Max-10 takes a back seat to none, and is beyond comparison with most."** Max-10, the only word processor with **"What You See Is What You Get"**. A word processor you will love at first sight.

CoCo Max III
The Famous Graphics Creator
$79.95 now $49.95

CoCo Max III: now a classic and probably the most popular CoCo program ever. If the price was the reason that stopped you before, this *special* will delight you. Listen (*Rainbow* 3/88): **"There are no limits to what you can do with this fabulous program. Speed, ease, animation, power and color, all in one package. CoCo Max III is the ultimate program for the CoCo 3."** Check any Rainbow (up to 4/89) for complete info on CoCo Max.

To top it off, we include a free **Demo Disk** plus the super **CoCo Show** program, which lets you make your own "slide shows".

Save $70
BOTH
CoCo Max III and **Max-10** for
$149.90 now $79.95

Desktop Publishing: together, **CoCo Max III** and **Max-10** form an unbeatable system for reports, flyers, invitations, greeting cards, signs, newsletters, etc. It's far beyond anything you've ever seen on a CoCo.

Here is one of the hundreds of unsolicited letters we got: **"Max-10 and CoCo Max III are wonderful. They are the first Color Computer products I have purchased that were even better than I hoped for."**

At **Colorware**, we all work hard to make you feel that way and we thrive on your appreciation.

FREE CHRISTMAS BONUS

Get any one of the "Add-Ons" below free with CoCo Max III or Max 10.
Select one of these: Max Fonts, Max Edit, the Color Drivers, the Spellchecker, the Max-10 Fonts, or the Hi-Res Pack. If you get both Max-10 and CoCo Max III, select any **two** free add-ons!

About Max-10

What the CoCo Community needs is a word processor that's rock solid, blindingly fast, feels like a Macintosh, makes all the others look boring, and does not cost $80.
Max-10 is just that and more. It allows on screen mixing of graphics and text, large headlines, multiple columns and full page preview (with graphics).
We swear that Max-10 will add excitement to your word processing, and that's no small task!
PRINTERS SUPPORTED: EPSON FX,MX,RX,LX AND COMPATIBLES; DMP 105,106,110,130; CGP220 (B&W); OKI 182,92,192; STAR NX-10, NX-1000.

Max-10 Add-ons

- **Max-10 Fonts**. 36 super fonts on 2 disks. Send for list. Order #C-23 ..... **$29.95**
NOTE: Max-10 and CoCo Max Fonts aren't interchangable.
- **Spell Checker** 50000 word dictionary for online spell checking and dictionary lookup. Perfect seamless integration with Max-10. Order #C-24..... **$29.95**

System Requirements

Max-10 and CoCo Max III Require: any CoCo 3; 1 or more disk drives; joystick or mouse; Radio Shack Hi Resolution joystick interface; a video or RGB monitor or a TV.

About CoCo Max III

Whether you doodle for fun or do graphics for a living, **CoCo Max** will amaze you. It's a promise.
Its major features include: Huge picture area (2 full hi-res 320x192 screens). Large editing window. **Zoom** mode for detail work. 28 point and click drawing tools. Shrink and stretch. **Rotation** at any angle (1.5° steps). 512K memory support (all features work with 128K too). Undo (Oops) feature to fix mistakes. **Animation**. Special effects. Color sequencing (8 colors, variable speed). 13 fonts (more available). Each font has 8 sizes and 5 styles for thousands of possible combinations. Translate program to convert most types of pictures. **CoCo Show** "slide show" program. Miniload program to help use pictures with your software. Color editing of patterns. Prints in single or double size. Select 16 of 64 available colors, all 64 colors are shown at once for easy selection. Pull-down menus. **40 paint brush** shapes. Two color lettering. Spray can. Amazing "flowbrush". RGB and composite monitor support. Colors print in 5 shades of gray.
PRINTERS SUPPORTED: EPSON RX,FX,MX,LX AND COMPATIBLES; STAR/GEMINI NX-10,NX-1000; DMP100,105,106,110,120,130,200; OKI 82A,182,192; CGP-220(B&W)
Color Drivers available. See next column.

CoCo Max III Add-ons

- **Max Fonts** disks. 95 fonts on 4 disks. Order #C-73..... **$49.95**
- **Max Edit** Create new fonts or edit existing ones. Order #C-16 ..... **$19.95**
- **Color Printer** drivers NX-1000 Rainbow, CGP-220 and Okimate 20. #C-2 ..... **$19.95**

CoCo Max I and II

- **CoCo Max I on tape.** See previous ads or write for info. For CoCo 1 or 2. Order #C-7..... **$59.95**
- **CoCo Max II.** For all disk CoCos. Multi-pak or Y-Cable required. #C-85..... **$69.95**

Digitizers

Digitize any picture from any video source (VCR, camera...) for use with CoCo Max III and Max-10.
DS-69. Requires Multipak. 2 pictures per second. Order #C-18..... **$99.95**
DS-69B Faster: 8 pix/sec. #C-92... **$149.95**

Call or Write Now

VISA (203) 348-9436 MasterCard
Weekdays 9-5 EST

Ordering Information: We accept Visa, Mastercard, Checks and M.O. C.O.D. is $4 extra Purchase orders are subject to credit approval. Connecticut residents add 8% sales tax. Shipping: $4 per order (usually UPS ground). UPS 2nd Day Air: $4 extra. Next Day service available. Canada: $6 per order (Airmail). Outside U.S. & Canada: Add 10% of order total.

COLORWARE

Colorware
242-W West Ave.
Darien, CT 06820

He's Just a Snowman

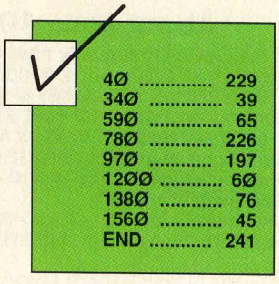
by Ruth E. Golias

Frosty, clad in a lime green scarf and a black silk hat, has a twinkle in his eyes as someone's playing his song, the words streaming one line at a time across the screen beneath him. Behind him hangs a gold crescent moon as he stands frozen, watching you listening to the tune of "Frosty the Snowman" sifting through the walls of your CoCo. The snow has already melted and the children have gone, taking his broomstick and corn cob pipe with them. Someone's even traded his button nose for a carrot.

Poor Frosty missed his train northward as the moon changes shifts with the hot sun. And he quickly dissolves into a heap of vintage clothing and a puddle of water. But he'll be back again some day.

This traditional holiday favorite is presented as a sing-along for the enjoyment of the kids (of all ages) in your home. ❑

CoCo3

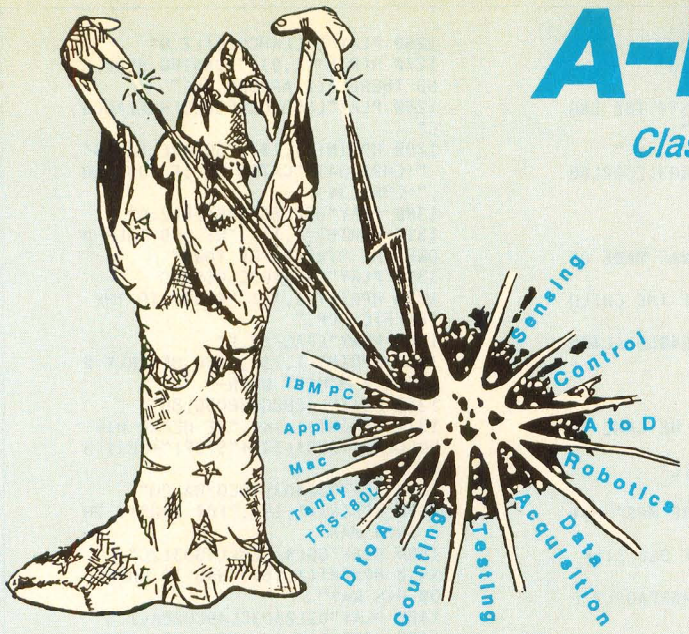


The listing: FROSTY

```
0 ' COPYRIGHT 1989 FALSOFT, INC
1 '*****************************
2 '*    FROSTY THE SNOW MAN    *
3 '*           BY              *
4 '*      RUTH E. GOLIAS       *
5 '*  2826 PACIFIC COAST HWY.  *
6 '*  TORRANCE, CALIF. 90505   *
7 '*****************************
8 '
10 ON BRK GO TO 1860
20 HSCREEN2:PALETTE CMP:PALETTE
0,29:PALETTE 1,48:PALETTE 2,0:PA
LETTE 3,23:PALETTE 4,52:PALETTE
```

A-BUS™ MAGIC

Classroom to advanced industrial applications.



Be a Wizard in your Lab, Factory, College, Home...

It used to be difficult and costly to do process control, robotics, data acquisition, monitoring and sensing with your computer. Now the low-cost A-BUS system makes it easy to do almost any project you can imagine.

Versatility. A-BUS cards handle most interfacing, from on/off switching, to reading temperatures, to moving robot arms, to counting events, to sensing switches...

Adaptability. The A-BUS is modular, allowing expansion well beyond your needs. It works with almost any computer, or even as a remote data station with the **new** serial adapters.

Simplicity. You can start using the A-BUS in minutes. It's easy to connect, and software is a breeze to write in any language.

Reliability. Careful design and rugged construction make the A-BUS the first choice in specialized I/O.

An A-BUS system consists of: ▪ An A-BUS adapter plugged into your computer ▪ A cable to connect the adapter to 1 or 2 A-BUS function cards. ▪ The same cable will also fit an A-BUS Motherboard for expansion to up to 25 cards in any combination.

NEW: REMOTE A-BUS! Use the new Serial (RS-232) Adapter or Processor to control any A-BUS system. Cards can be up to 500 ft away using phone type cable, or off premises using a modem. Call or send for the new A-BUS Catalog which covers all the products.

Important

All A-BUS Systems: ♦ Come assembled and tested ♦ Include detailed manuals with schematics and programming examples ♦ Can be used with almost any language (BASIC, Pascal, C, assembler, etc.) using simple "IN" and "OUT" commands (PEEK and POKE on some computers) ♦ Can grow to 25 cards (in any combination) per adapter ♦ Provide jumper selectable addressing on each card ♦ Require a single low cost unregulated 12V power supply ♦ Are usually shipped from stock. (Overnight service is available.)

About Alpha Products

Founded in 1976 for the purpose of developing low cost I/O devices for personal computers. Alpha has grown to serve over 70000 customers in over 60 countries. A-BUS users include many of the Fortune 500 (IBM, Hewlett-Packard, Tandy, Bell Labs, GM...) as well as most major universities. A-BUS products are U.S. designed, U.S. built, and serviced worldwide.
Overseas distributors: England: Caldy Science Assoc. Ltd., Merseyside, 051 342 7033.
Australia: Brumby Technologies Pty. Ltd., NSW, 759 1638. **France:** Coserm, Rungis, 46 86 64 75

Inputs, Outputs, etc.

Analog Input: 8 analog inputs. 0-5.1V in 20mV steps (8 bits). 0-100V range possible. 7500 conversions/second. **AD-142: $142**

12 Bit A to D: Analog to digital converter. Input range -4V to +4V, expandable to 100V. On-board amplifier. Resolution 1mV. Conversion time 130ms. 1 channel. (Expand to 8 channels with the RE-156 card.) **AN-146: $153**

Relay Card: 8 individually controlled industrial relays each with status LED's (3A at 120VAC contacts, SPST). **RE-140: $142**

Reed Relay Card: 8 reed relays (20mA at 60VDC, SPST). Individually controlled and latched, with status LEDs. **RE-156: $109**

D/A converter: 4 Channel 8 Bit D/A converter with output amplifiers and separate adjustable references. **DA-147: $149**

24 line TTL I/O: Connect 24 input or output signals (TTL 0/5V levels or switches). Variety of modes. (Uses 8255A) **DG-148: $72**

Digital Input: 8 optically isolated inputs. Input can be 5 to 100V voltage levels or switch closures. **IN-141: $65**

Digital Output Driver: 8 outputs: 250mA at 12V. Drive relays, solenoids, stepper motors, lamps, etc. **ST-143: $78**

Clock with Alarm: Powerful clock/calendar. Battery backup. Timing to 1/100 sec. Alarm relay, LED and buzzer. **CL-144: $98**

Touch Tone Decoder: Each tone is converted into a number which is stored on the board. **PH-145: $87**

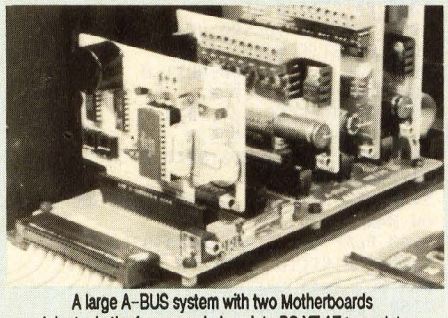
A-BUS Prototyping card: 4x4.5" card. Will accept up to 10 I.C.s. With power & ground bus. **PR-152: $16**

Counter Timer: Three 16 bit counters/timers. Use seperately or cascade for long (48 bit) counts. **CT-150: $132**

Call our application engineers to discuss your project.

Motion Control

Smart Quad Stepper Controller: The world's finest. On board microprocessor controls four motors simultaneously. Uses simple English commands like "MOVE ARM 10.2 (INCHES) LEFT". For each axis, you control coordinates (absolute or relative), ramping, speed, units, scale factors, etc. Many inputs for limit switches, etc. On the fly reporting of speed, position... Built in drivers for small motors (such as MO-103 or 105). **SC-149: $299**
Options: ► 5 amp/phase power booster for 1 motor: **PD-123: $49**
► Remote "teach" keypad for direct motor control: **RC-121: $54**



A large A-BUS system with two Motherboards
Adapter in the foreground plugs into PC,XT,AT type slot.

Stepper Driver Kit: For experimenting with stepper motors. Includes 2 MO-103 motors and a ST-143 dual driver **PA-181: $99**

Stepper Motors: (4 phase, unipolar)
MO-103: 2¼" dia, ¼" shaft, 7.5°/step, 12V, 5 oz-in torque. **$15**
MO-104: 2" dia, ¼" shaft, 1.8°/step, 5V, 60 oz-in torque. **$45**
MO-105: 1.7" square. .2" shaft, 3.75°/step, 12V, 6 oz-in. **$15**

A-BUS Adapters

► Can address 64 ports and control up to 25 A-BUS cards.
► Require one cable. Motherboard required for more than 2 cards.

A-BUS Parallel Adapters for:

IBM PC/XT/AT & compatibles. Uses one short or long slot.	**AR-133: $69**
Apple II,II+,IIe Plugs into any slot inside.	**AR-134: $52**
Commodore 64,128 Plugs into Expansion Port on back.	**AR-139: $48**
TRS-80 Model 102,200 Uses 40 pin "System bus".	**AR-136: $76**
Model 100 (Tandy portable) Plugs into socket on bottom.	**AR-135: $75**
TRS-80 Model 3,4,4D Y-Cable available if 50 pin bus is used.	**AR-132: $54**
TRS-80 Model I Plugs into 40 pin expansion bus.	**AR-131: $39**
Tandy Color Computers Fits ROM slot, Multipak or Y-Cable	**AR-138: $49**

A-BUS Cable: Necessary to connect any parallel adapter to one A-BUS card or to first motherboard. 50 pin, 3 ft. **CA-163: $24**
Special Cable for two A-BUS cards **CA-162: $34**

Serial Adapter: Connect A-BUS systems to any RS-232 port. Allows up to 500 ft from computer to A-BUS. **SA-129: $149**

Serial Node: To connect additional SA-129/A-BUS systems to a single RS232 serial port (max 16 nodes). **SN-128: $49**

Serial Processor: same as above plus built in BASIC for off-line monitoring, logging, decision making, etc. **SP-127: $189**
Use SA-129 or SP-127 with modems for remote data acquisition.

Motherboard: Holds up to 5 A-BUS cards in sturdy aluminum frame with card guides. A sixth connector allows (using cables CA-161: $12) additional Motherboards to be added. **MB-120: $108**

Power Supply: Power pack for up to 4 cards. **PS-126: $12**

Complete Catalog Available
For Orders and Info call (203) 656-1806
Weekdays from 9 to 5 EST or **FAX** 203 656-0756

Ordering Information: We accept Visa, Mastercard, Checks, and M.O. C.O.D. is $4 extra. Purchase orders are subject to credit approval. CT residents add 7.5% sales tax.
Shipping: $4 per order (usually UPS ground). UPS 2nd Day Air: $4 extra. Next Day service available. *Canada:* $6 per order (Airmail). *Outside US and Canada:* Add 10% of order total.

ALPHA Products
a Sigma Industries Company
242-W West Avenue, Darien, CT 06820

```
5,63:PALETTE 6,46:PALETTE 7,62:P
ALETTE 8,45:PALETTE 9,38:PALETTE
10,32:HCLS0
30 HCOLOR 5
40 HPRINT(11,2),"FROSTY THE SNOW
 MAN"
50 HCOLOR 1
60 HLINE(0,112)-(320,192),PSET,B
F
70 HCIRCLE(50,42),18,4,1,.25,.70
80 HCIRCLE(58,40),20,4,1,.30,.66
90 HPAINT(38,42),4,4
100 HCOLOR 2
110 HCIRCLE(174,76),16,2,.7,.44,
.06
120 HCIRCLE(174,72),21,2,.5
130 HPAINT(160,70),2,2
140 HCIRCLE(174,68),20,2,.6,.46,
.05
150 HPAINT(174,72),5,2
160 HPAINT(174,60),3,2
170 HCIRCLE(174,59),22,2,.6,.42,
.08
180 HPAINT(174,56),2,2
190 HDRAW"BM168,73;U2R2D2L2"
200 HPAINT(169,72),2,2
210 HDRAW"BM179,73;U2R2D2L2"
220 HPAINT(180,72),2,2
230 HDRAW"BM174,73;F3G1L2U3"
240 HPAINT(175,75),9,2
250 HDRAW"BM171,79;FR5E"
260 HDRAW"BM189,80;R1F1R2F1R2F1L
1G1L1G1L3G1L2G1L3G1L14H4E1"
270 HDRAW"BM159,79;L2G1L2G1L2D2R
3D2R3D2E4BD5BR7D28ND4L3ND4L3ND4L
3ND4U29H1"
280 HPAINT(180,84),3,2
290 HDRAW"BM156,86;L1D20ND4H3ND4
H3ND4U18E2"
300 HPAINT(154,86),3,2
310 HCIRCLE(174,122),37,2,1,.03,
.48
320 HCIRCLE(183,110),32,2,1,.78,
.10
330 HDRAW"BM210,126;G1L2G1L3H1L2
H2U5NR13U4NR15H2U4H2U4H2U4H1"
340 HPAINT(208,124),2,2
350 HPAINT(208,118),3,2
360 HCIRCLE(164,110),32,2,1,.42,
.70
370 HDRAW"BM137,126:F1R2F1R3E1R2
E2U5NL13U4NL15E2U4"
380 HPAINT(143,124),2,2
390 HPAINT(143,118),3,2
400 B$="U4E1R4F1D4G1L4H1"
410 HDRAW"BM172,95;XB$;"
420 HPAINT(173,93),2,2
430 HDRAW"BM172,108;XB$;"
440 HPAINT(173,107),2,2
450 HDRAW"BM172,121;XB$;"
460 HPAINT(173,120),2,2
470 HPAINT(158,111),5,2
480 FOR X=1 TO 50
490 B1=RND(320):B2=RND(100)
500 HSET(B1,B2,5)
510 HSET(168,72,5):HSET(169,72,5
)
520 HSET(179,72,5):HSET(180,72,5
)
530 HSET(168,72,2):HSET(169,72,2
)
540 HSET(179,72,2):HSET(180,72,2
)
550 NEXT X
560 FOR D=1 TO 500:NEXT D
570 PLAY"T4:V31:O2L2GL4.EL8FL4GO
3L2C"
580 HPAINT(1,168),1,5
590 HPRINT(1,21),"WAS A JOLLY HA
PPY SOUL,"
600 PLAY"O2L8BO3CL4DCO2BAL2.G"
610 HPAINT(1,168),1,5
620 HPRINT(1,21),"WITH A CORN CO
B PIPE AND A BUTTON NOSE"
630 PLAY"L8BO3CL4DCO2BL8AAL4GO3C
O2E"
640 HPAINT(1,168),1,5
650 HPRINT(1,21),"AND TWO EYES M
ADE OUT OF COAL."
660 PLAY"L8GAL4GFEFL2.G"
670 HPAINT(1,168),1,5
680 HPRINT(1,21),"FROSTY THE SNO
W MAN IS A FAIRY TALE"
690 HPRINT(1,22),"THEY SAY,"
700 PLAY"L2GL4.EL8FL4GO3L2CO2L8B
O3CL4DCO2BAL2.G"
710 HPAINT(1,168),1,5
720 HPAINT(1,176),1,5
730 HPRINT(1,21),"HE WAS MADE OF
 SNOW,"
740 HPRINT(10,22),"BUT THE CHILD
REN KNOW"
750 PLAY"L8BO3CL4DCO2L4BL8AAL4GO
3CO2E"
760 HPAINT(1,168),1,5
770 HPAINT(1,176),1,5
780 HPRINT(1,21),"HOW HE CAME TO
 LIFE ONE DAY."
790 PLAY"L8GAL4GFEDL2.C"
800 HPAINT(1,168),1,5
810 HPRINT(1,21),"THERE MUST HAV
E BEEN SOME MAGIC IN"
820 HPRINT(1,22),"THAT OLD SILK
HAT THEY FOUND."
830 PLAY"L4CAAO3CCO2BAGEFAGFL2.E
"
840 HPAINT(1,168),1,5
850 HPAINT(1,176),1,5
860 HPRINT(1,21),"FOR WHEN THEY
PLACED IT ON HIS HEAD"
870 HPRINT(1,22),"HE BEGAN TO DA
NCE AROUND."
880 PLAY"L4EDDGGBBO3DL8DO2BO3L4D
CO2BAL2G"
890 HPAINT(1,168),1,5
900 HPAINT(1,176),1,5
910 HPRINT(1,21),"OH! FROSTY THE
 SNOW MAN WAS ALIVE"
920 HPRINT(1,22),"AS HE COULD BE
"
930 PLAY"L4.GP8L2GL4.EL8FL4GO3L2
CO2L8BO3CL4DCO2BAL2.G"
940 HPAINT(1,168),1,5
950 HPAINT(1,176),1,5
960 HPRINT(1,21),"AND THE CHILDR
EN SAY HE COULD"
970 HPRINT(1,22),"LAUGH AND PLAY
"
980 PLAY"L8BO3CL4DCO2BL8AAL4GO3C
O2E"
990 HPAINT(1,168),1,5
1000 HPAINT(1,176),1,5
1010 HPRINT(1,21),"JUST THE SAME
 AS YOU AND ME."
1020 PLAY"L8GAL4GFEDL2.C"
1030 HPAINT(1,168),1,5
1040 PALETTE 0,45
1050 FOR D=1 TO 500:NEXT D
1060 PALETTE 0,62
1070 FOR D=1 TO 500:NEXT D
1080 HPAINT(2,1),7,8
1090 HCIRCLE(50,42),20,9
1100 HPAINT(50,42),9,9
1110 FOR D=1 TO 500:NEXT D
1120 HCOLOR 2
1130 HPRINT(10,2),"FROSTY THE SN
OW MAN"
1140 PLAY"O2L2GL4.EL8FL4GO3L2C"
1150 HPRINT(10,3),"KNEW THE SUN
WAS HOT THAT DAY,"
1160 PLAY"O2L8BO3CL4DCO2BAL2.G"
1170 HPRINT(10,4),"SO HE SAID "+
CHR$(34)+"LET'S RUN AND"
1180 PLAY"L8BO3CL4DCO2BL8A"
1190 HPRINT(10,5),"WE'LL HAVE SO
ME FUN NOW"
1200 PLAY"AL4GO3CO2EL8G"
1210 HPRINT(10,6),"BEFORE I MELT
 AWAY."+CHR$(34)
1220 PLAY"AL4GFEFL2.GP8"
1230 HPRINT(10,7),"DOWN TO THE V
ILLAGE.WITH"
1240 PLAY"L2GL4.EL8FL4GO3L2CO2L8
B"
1250 HPRINT(10,8),"A BROOMSTICK
IN HIS HAND."
1260 PLAY"O3CL4DCO2BAL2.G"
1270 HPRINT(1,9),"RUNNING HERE A
ND THERE ALL AROUND THE"
1280 PLAY"L8BO3CL4DCO2BL8AAL4GO3
C"
1290 HPRINT(1,10),"SQUARE SAYIN'
 "+CHR$(34)+"CATCH ME IF YOU CAN
."+CHR$(34)
1300 PLAY"O2EL8GAL4GFEDL2.C"
1310 HPRINT(1,11),"HE LED THEM D
OWN THE STREETS OF TOWN"
1320 PLAY"L4CAAO3CCO2BAG"
1330 HPRINT(1,12),"RIGHT TO THE
TRAFFIC COP."
1340 PLAY"EFAGFL2.E"
1350 HPRINT(1,13),"AND HE ONLY P
AUSED A MOMENT WHEN—"
1360 PLAY"L4EDDGGBBO3DL8D"
1370 HPRINT(1,14),"HE HEARD HIM
HOLLER "+CHR$(34)+"STOP!"+CHR$(3
4)
1380 PLAY"O2BO3L4DCO2BAL2G"
1390 HPRINT(1,15),"FOR FROSTY TH
E SNOW MAN"
1400 PLAY"GGL4.EL8FL4GO3L2C"
1410 HPRINT(1,16),"HAD TO HURRY
ON HIS WAY"
1420 PLAY"O2L8BO3CL4DCO2BAL2.G"
1430 HPRINT(1,17),"BUT HE WAVED
GOODBYE SAYIN',"
1440 PLAY"L8BO3CL4DCO2BL8AA"
1450 HPRINT(1,18),+CHR$(34)+"DON
'T YOU CRY,"+CHR$(34)
1460 PLAY"L4GO3CO2E"
1470 HPRINT(1,19),+CHR$(34)+"I'L
L BE BACK AGAIN SOME DAY."+CHR$(
34)
1480 PLAY"L8GAL4GFEDL2.C"
1490 FOR D=1 TO 500:NEXT D
1500 HSCREEN2:HCOLOR 1
1510 HLINE(0,112)-(320,192),PSET
,BF
1520 HCIRCLE(50,42),20,9
1530 HPAINT(50,42),9,9
1540 HDRAW"BM189,149;C2;R2F1R2F1
G1L1G1L3G1L2G1L3G1L12H2"
1550 HDRAW"BM159,148;L2G1L2G1L2D
2R3D2R3D2E4BD5BR7D18ND4L3ND4L3ND
4L3ND4U19H2"
1560 HDRAW"BM156,156;L1D10ND4H3N
D4H3ND4U8E2"
1570 HCIRCLE(174,146),21,2,.3
1580 HCIRCLE(174,142),20,2,.4,.4
6,.05
1590 HCIRCLE(174,139),20,2,.4,.4
5,.05
1600 HCIRCLE(174,133),22,2,.6,.4
2,.08
1610 HPAINT(174,130),2,2
1620 HPAINT(174,134),3,2
1630 HPAINT(174,136),2,2
1640 HPAINT(174,144),10,2
1650 HPAINT(174,152),3,2
1660 HPAINT(154,157),3,2
1670 HDRAW"BM210,170;G1L2G1L3H1L
2H2U5NR13U4R15D2L1D2L1D5"
1680 HPAINT(208,168),2,2
1690 HPAINT(208,161),3,2
1700 HDRAW"BM130,164;F1R2F1R3E1R
2E2U5NL13U4L15D2R1D2R1D5"
1710 HPAINT(132,162),2,2
1720 HPAINT(132,156),3,2
1730 HDRAW"BM140,175;XB$;"
1740 HPAINT(142,175),2,2
1750 HDRAW"BM190,178;XB$;"
1760 HPAINT(192,176),2,2
1770 HDRAW"BM176,180;XB$;"
1780 HPAINT(178,178),2,2
1790 HDRAW"BM179,162;U2R2D2L2"
1800 HPAINT(180,161),2,2
1810 HDRAW"BM186,167;U2R2D2L2"
1820 HPAINT(187,166),2,2
1830 HPRINT(10,2),"I'LL BE BACK
AGAIN SOME DAY."
1840 PLAY"O2L8GAL4GFEDL2.C"
1850 GOTO1850
1860 PALETTE CMP:HSCREEN 0:WIDTH
32:CLS
```

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Curious Chris

by Larry Boeldt

Dear Larry:

I got my first CoCo (a 64K ECB CoCo 2 to be exact) about one year ago. I've been a subscriber to THE RAINBOW since July 1988, and recently I bought a CoCo 3. I would like to know about OS-9—what are its advantages and disadvantages? How is it used? Is it like RS-DOS*?*

Also, what is all the talk about ADOS 3*?*

Chris Tracy
Mt. Pulaski, Illinois

Let me start with *ADOS 3* and move up from there. *ADOS 3* is an addition to *RS-DOS* that can be burned into an EPROM. You can set *ADOS* to start up on an 80-column screen with the colors of your choice and a personal start-up message. *ADOS* allows for double-speed printing and disk I/O. It has some added commands and nice features. For a further review of *ADOS* see the July '87 issue of THE RAINBOW. A new product that works with *ADOS 3*, called *EXTENDED ADOS 3*, is reviewed in the October 1989 issue.

All of your Disk BASIC programs work with *ADOS 3* in theory. There may be a few that are not compatible because they occupy the same memory area. OS-9, on the other hand, is a totally different story.

OS-9 is not very similar to *RS-DOS*. It is a complete, stand-alone operating system that is more powerful and (in my opinion) a generally better operating system than *RS-DOS* or *ADOS*. Because of its environment *RS-DOS* software does not work on OS-9. One big plus for OS-9 is its multitasking environment that allows many programs to run simultaneously in separate windows or screens.

OS-9 is not that hard to learn. Once a user grasps the basic concepts of the operating system, it is a lot of fun. OS-9 Level II comes with BASIC09 so you have all you need to get started with the package.

The operating system you are likely to purchase depends on your wants and needs. If you have a large library of software already under *RS-DOS* and do not want to purchase more for OS-9, I suggest *ADOS 3*. If you don't have much *RS-DOS* software and would like to have a full-blown multitasking operating system, go for OS-9. It is worth the money. There are a large number of books to help you learn OS-9, in addition to articles in THE RAINBOW.

Drawing Printouts

Dear Larry:

I have a 128K CoCo 3, FD-502 disk drive, DMP-105 printer, Color Computer Artist, *and OS-9 Level II. How do I get* Color Computer Artist *and OS-9 Level II working so that I can print drawings?*

Michael E. Sterbank
Erie, Pennsylvania

The back cover of *Color Computer Artist*'s manual states that it supports a serial printer. There should be instructions in the book that supply the proper information to make the printouts. Your DMP-105 should be supported since it is such a popular printer and is sold by Radio Shack. If you have problems, write back to me with a more specific description. Include your phone number so I can reply more quickly.

Rounding Things Up

Dear Larry:

How do I round real numbers to tenths, hundredths, etc.?

Rick Thorngrove
Pittsburgh

The following formula rounds numbers to hundredths (two decimal places):

```
10 A=10.436
20 R=INT((A*100)+.5)/100
30 PRINT R
```

To round numbers to the thousandths, simply change the 100s to 1000s. To round to the ten-thousandths place, change the 100s to 10000s, and so on.

Clarifying CLEAR

Dear Larry:

Can you clarify the CLEAR *command for me? I can only deduce that the command reserves bytes of string space and specifies the highest BASIC address.*

I use my CoCo 2 to tune and adjust digital altimeters and variometers for hang glider pilots. The programs are so long that they almost occupy every nook and cranny of the 64K memory. Am I right in picking the first embedded M/L programs as the highest BASIC address? How do I estimate how many string storage bytes need to be reserved?

What happens if you leave too few or too many string storage bytes? Or if you don't specify them at all?

Gilbert Roberts
Santa Barbara, California

You are correct in your deductions about string space and BASIC address. To start, if you need more memory, use the following commands before running your program: `POKE 25,X:NEW` where `X` is 14 for disk systems and 6 for cassette systems. This clears the CoCo 2 graphics screen area if it is not being used.

If you do not use the `CLEAR` command in the beginning of a program, ECB defaults to 200 bytes, which is not very much. To find out the minimum amount of string space to allocate, count up all the string variables you use in the program. To be totally safe, assume a maximum string length of 255 for each string. Try 80 or 100 if you *know* they will be much smaller. Add five to whatever value you decide upon, and multiply that times the number of string variables you have. Then add the total size of your M/L programs to this value, and you have the best value for your `CLEAR` statement. Why add five to your string

---

Larry Boeldt has programmed on the Color Computer for five years. He has experience with BASIC, Pascal and FORTRAN IV. He runs a software customizing business for the CoCo market.

length? BASIC uses five bytes for every variable as a variable pointer so it knows where to find the information later.

If you specify a number too large, you waste valuable memory. If you specify a number too small, either your M/L programs are overwritten or you get an OS (Out of String Space) Error. In either event your program crashes or stops executing.

To the Rescue

Dear Larry:

A letter from Carl Fraser, of Kingston, Ontario, in the September issue asks about a problem with the HGET *and* HPUT *commands. You asked for help so here is the answer:*

First, the effect is not caused by a bug in the CoCo 3 software. It might be called a user-unfriendly version of GET/PUT. *On the CoCo 1 and 2, the commands have a G option. This is used to store the rectangle's contents with full graphic detail. What the G option actually does is allow the* GET/PUT *buffer to start and end at any pixel. When G is not used, the buffer starts and ends at byte boundaries.*

Tandy states in great detail on pages 174 and 175 in my version of the owners manual that in HSCREEN 1, *if you tell* BASIC *to* HGET(10,5)-(30,15), *it will actually* HGET(8,5)-(28,15). *This happens since* HSCREEN 1 *has four dots per byte, with 8 and 28 being byte boundaries.*

It is surprising that Carl's program worked at all. The HGET *boundaries are in the middle of the bytes.* HSCREEN 4 *has four dots per byte: 10/4=2.5 20/4=5 for two and one-half bytes. Note the* HPUT*s that work start in the middle of a byte; the ones that do not work start on a byte: 26/4=6.5, 570/4=142.5 works; 28/4=7, 400/4=100 and 540/4=142 are garbage. That is to say that even though the* HGET *is incorrect, at least a corresponding* HPUT *works. The answer is to follow Tandy's instructions; start and end evenly at bytes.*

Ideally I would like to see someone patch the software to use the G option, but considering the difficulty, that's too much to ask. I am sure all CoCo users would prefer the extra code to the silly picture of the programmers in ROM.

Robert Gault
Grosse Pointe Woods, Michigan

Thank you, Robert, for clearing up this problem. I agree with you about the extra code. The 6K of memory could be used for HSCREEN saving routines, the HPUT fix, or perhaps a better BASIC program editor.

Questions about specific BASIC programming problems can be addressed to BASICally Speaking, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Larry through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "BASICally Speaking" online, which has complete instructions.

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PEG ME!

by George Quellhorst

HI-Q is a game that has at one time or another both frustrated and entertained just about every person in the civilized world. Well, thanks to the miracle of computers, the frustration has been taken out of this game and all that is left is pure unadulterated entertainment. *CoCo Q* is the computerized version of this traditional game.

CoCo-Q works only on the Color Computer 3, in conjunction with either an RGB or composite monitor. The game can be played on a regular color television, but the quality of the picture obtained is totally unpredictable and varies in accordance with the age, quality and characteristics of the particular television set you're using. The bottom line is that a regular TV is not capable of reproducing the high-resolution graphics created by the Color Computer 3. If you are using such a TV as a monitor with your computer, type in WIDTH80 and press ENTER. The readability of the text on your 80-wide screen is a good indication of the results you can expect when running any program that uses either Hi-Res text or graphics screens.

Toward the end of this article I supply you with a few hints to improve the quality of your display. Meanwhile, if you are using an RGB monitor, leave the program as is. However, if you are using a composite monitor or regular TV, remove the REM from Line 3 and insert a REM in Line 2.

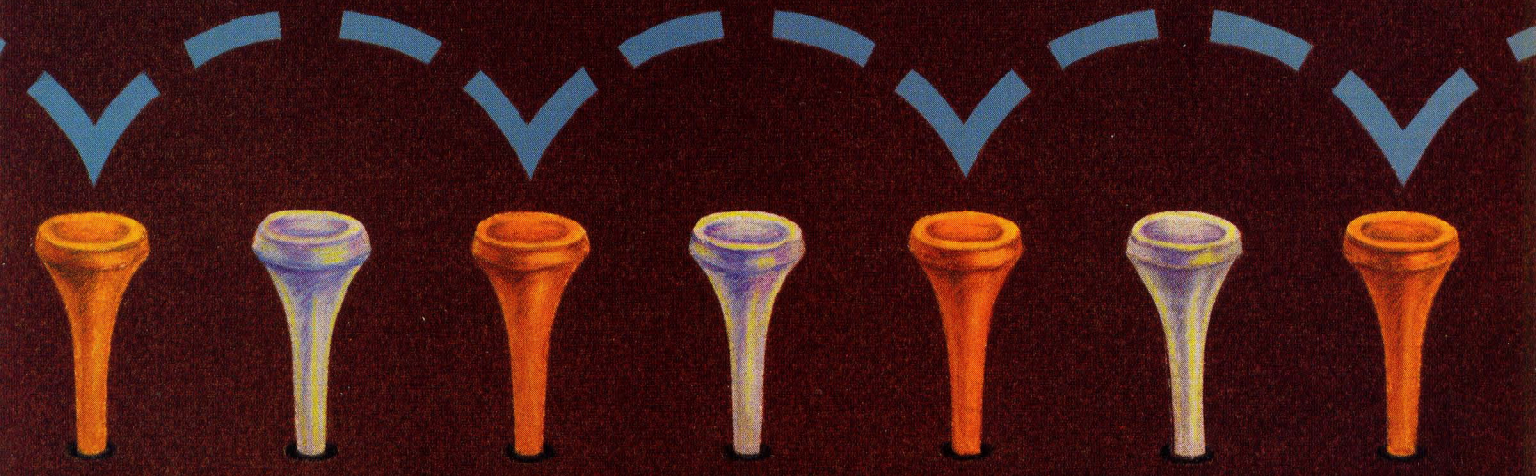
The original game board consists of 33 holes arranged in the form of a cross. With the exception of the one in the center, each hole contains a peg or game piece. The game is played by removing a single peg from its hole and jumping with this peg over an adjacent peg into an empty hole. At the same time the jumped-over peg is removed from the game board. The game is over when no more jumps are possible. When only one peg remains at the end of the game, the game has been won. You may consider yourself an expert when this last peg happens to be the one in the center of your game board.

In this computerized version the blue-colored squares are the holes still containing a peg, while the white-colored squares represent holes that no longer contain a peg (empty holes). Once the program is loaded and the game board is displayed on the screen, you have several options. We will discuss these one at a time.

Press the space bar, and the computer configures itself to let you play a regular game. The cursor is located in the center square. By using the arrow keys, move the cursor on top of the peg you want to use as your jumping peg, then press ENTER. Now move the cursor to the empty hole that you want to jump to and press ENTER once more. The computer places the peg you jumped with into the empty hole and removes the jumped-over peg. Repeat this procedure until no more moves are possible. The idea is to have only one peg remaining at game's end. The single peg left over has to be in the center square, of course.

After each move, the computer checks for any moves remaining on the game board. However, since you must make at least six moves before this is possible, this feature is not activated (see Line 32) until you have made six moves. At the end of the game the computer informs you that the game is over and tells you how many pegs remain on the board. The negative effect of this feature is a noticeable increase in response time because it takes the computer about one and half seconds to check your board. If you would rather have the decreased response time, simply replace Line 32 with a

George Quellhorst has owned a CoCo since they were first introduced. He lives in Painesville, Ohio, where he enjoys writing programs on his two CoCo 2s and CoCo 3. He can be contacted at 1572 Mentor Ave., Painesville, OH 44077; (216) 352-2977.



return statement by typing 32 RETURN and pressing ENTER.

If at any time during the game you want to start over, press the space bar and a new game is set up. Pressing F1 returns the program to the main menu or the start-up screen. At the end of each game the board remains unchanged until the space bar or F1 is pressed. This enables you to prove to your friends that yes, you had indeed only one peg remaining.

Pressing any number between one and five triggers the computer to play one of the five demonstration games I have incorporated into this program. Demo Game 1 is the one and only true winning game — a game with one peg left in the center square — just to prove that it can indeed be done. The remaining demos demonstrate four other ending combinations you might want to give a try.

Of course there are other combinations of moves that lead to the same end results as the ones presented in the five demo games. The demo games were included mainly because the data necessary to present them was already present in the program for the Teaching mode.

The Teaching mode feature was added to give younger hackers a chance to show off their capabilities. After pressing the letter T at the main menu, the computer prompts you for the number of the game you want to learn. The numbers correspond to those in the demonstration games. For example, Game 1 in the Teaching mode is the same one as Demo Game 1. After you press the desired number, the board is set up to play a normal game with the exception that the computer does not allow you to make a wrong move. When ENTER is pressed for the second time on the empty hole, a beep sounds and the move is not completed. The computer allows you a total of three wrong moves. After the third incorrect move, a small square cursor is drawn on top of the peg you should use to jump with. Another small cursor is drawn on top of the empty hole, and the game cursor is positioned on top of the first cursor. All you have to do is complete the move.

The program counts every wrong move you make while learning, and the total number of wrong moves is printed on the screen at the end of each game. My twelve-year-old daughter, Heidi, played Game 1 in the Teaching mode until she had the whole thing memorized.

Pressing the space bar while playing a teaching game starts the same teaching game over from the beginning, with the mistake counter reset to zero. Press F1 to return to the title screen and to escape from the Teaching mode.

Although this game is mainly designed for younger computer hackers, I find that many adults young at heart derive pleasure from playing. Besides, we need more intellectual computer games that we can let our youngsters play. Not counting the ever-popular solitaire game, *CoCo-Q* is by far the game most played in my family's household.

For those of you who use a regular color TV with the CoCo 3, the following hints may help you obtain a better quality picture when you play this game. First of all, to compensate for the horizontal overscan encountered in most color TVs, I have left considerable margins on both sides of the game board. Therefore you should be able to view the entire game board on any regular television set.

I find that the colors reproduced by a TV set are usually not the ones specified in the program. Therefore changing the PALETTE colors in the program usually gives you a more pleasing picture. Take a look at Line 3 — this is where the colors for a composite monitor are defined. A color TV uses a composite video signal, as does a composite monitor. The PALETTE 1,59 controls the background color and should be light blue. PALETTE 2,11 is the color of the pegs on the game board and should be very dark blue. PALETTE 4,36 controls the color of the letters on the game board while you are playing a game. They should be yellow. And the last one, PALETTE 8,63, produces white and is the color of an empty hole after a peg is removed during play. The statement BP=59 at the end of Line 3 is the border color. This number should be the same as the number specified for palette Slot 1 if you want the border color to be the same color as that of the background.

By substituting different values for these four palette slots, you may be able to improve the quality of your picture. For example, the numbers 8, 9, 10 and 11 each produce some sort of blue, at least on the TV set I used. By changing the number in palette Slot 11 you're able to change the color of the pegs. ❑

CoCo 3

```
9 ..... 88
15 ..... 243
25 ..... 120
33 ..... 215
44 ..... 65
55 ..... 201
67 ..... 206
76 ..... 119
84 ..... 13
END ..... 162
```

The listing: COCO-Q

```
0 ' COPYRIGHT 1989 FALSOFT, INC
1 CLEAR2000:POKE65497,0:POKE4401
4,71:POKE44015,81:POKE41598,255:
POKE&HF80F,0:POKE&HF84F,0:POKE&H
F89C,0:POKE140,180:EXEC43350:DIM
 H(49),A(5,31),B(5,31),K(33),L(3
3),G(49):ONBRKGOTO89
2 RGB:PALETTE1,25:PALETTE2,9:PAL
ETTE4,54:PALETTE8,63:BP=25
3 'CMP:PALETTE1,59:PALETTE2,11:P
ALETTE4,36:PALETTE8,63:BP=59
4 WIDTH40:CLS2:ATTR3,1:POKE65434
,BP:GOSUB78:GOSUB80:GOSUB78:POKE
59063,57:HSCREEN2:POKE59063,32:H
CLS1:HCOLOR2,0:GOSUB69
5 A$="R8D8L8U8BR12":B$=A$+A$+A$:
FORT=1TO7:C$=C$+A$:NEXT:HDRAW"C3
BM126,15S8"+B$:HDRAW"BM126,39"+B
$:HDRAW"BM78,63"+C$:HDRAW"BM78,8
7"+C$:HDRAW"BM78,111"+C$:HDRAW"B
M126,135"+B$:HDRAW"BM126,159"+B$
6 FORT=1TO33:HPAINT(K(T)+4,L(T)-
4),2,3:NEXTT:HPAINT(158,95),8,3:
V=1:U=0:IFDS=1THENDS=0:RETURN
7 IFTM=0 THENHCOLOR8,0:GOSUB73
8 IFDD=0THENPOKE59108,230:HSCREE
N2:POKE59108,231:POKE65434,BP:GO
TO48ELSE U=0:X=154:Y=99:CC$="R4U
4L4D4":HCOLOR8,0:GOSUB70
9 P$=INKEY$:IFP$=" "THENV=1:MI=0
:GOTO6
10 IFPEEK(343)=191THENTM=0:DD=1:
DS=1:HCOLOR1,0:GOSUB70:GOSUB74:G
OSUB75:GOSUB76:HCOLOR8,0:GOSUB73
:GOSUB6:GOTO48
11 IFPEEK(344)=247THEN X=X+24:GO
SUB67 ELSEIFPEEK(343)=247THEN X=
X-24:GOSUB67 ELSEIFPEEK(341)=247
THEN Y=Y-24:GOSUB67 ELSEIFPEEK(3
42)=247THEN Y=Y+24:GOSUB67
12 IFY=195THENY=171ELSEIFY=3THEN
Y=27ELSEIFX=58THENX=82ELSEIFX=25
0THENX=226ELSEIFX<130ANDY=51THEN
X=130ELSEIFX>178ANDY=51THENX=178
ELSEIFX=106ANDY=27THENX=130
13 IFX=202ANDY=27THENX=178ELSEIF
X=<130ANDY=147THENX=130ELSEIFX>1
78ANDY=147THENX=178ELSEIFX=106AN
DY=171THENX=130ELSEIFX=202ANDY=1
71THENX=178
14 IFHPOINT(X+2,Y-3)=2 THENHDRAW
"S8C8BM"+STR$(X)+","+STR$(Y)+CC$
 ELSE HDRAW"C2BM"+STR$(X)+","+ST
R$(Y)+CC$
15 FORT=1TO25:NEXTT:IFHPOINT(X+2
,Y-3)=2THENHDRAW"C2BM"+STR$(X)+"
,"+STR$(Y)+CC$ELSEHDRAW"C8BM"+ST
R$(X)+","+STR$(Y)+CC$
```

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M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
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T3	GR14			

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```
16 IFP$=CHR$(13)ANDHPOINT(X+2,Y-
3)=2THENX1=X:Y1=Y:IFHPOINT(X1,Y1
)=2THENGOSUB68
17 IF P$=CHR$(13) AND HPOINT(X1,
Y1)=2 AND HPOINT(X,Y)=8THENGOSUB
19
18 GOTO9
19 IFX=X1 THEN21ELSEIFY=Y1 THEN2
5ELSERETURN
20 ' Down move.
21 IF X=X1 AND Y1<Y THEN 23 ELSE
 IF Y1-Y=48 AND HPOINT(X1,Y1)=2A
ND HPOINT(X,Y+24)=2 AND HPOINT(X
,Y)=8 THEN GOSUB60:HPAINT(X1,Y1)
,8,3:GOSUB67:HPAINT(X1,Y+24),8,3
:GOSUB67:HPAINT(X,Y),2,3:GOSUB67
:U=U+1:IFDG=0THENGOSUB32
22 ' Up move.
23 IF X=X1 AND Y1>Y THEN 25 ELSE
 IF Y-Y1=48 ANDHPOINT(X1,Y1)=2 A
ND HPOINT(X,Y1+24)=2 AND HPOINT(
X,Y)=8 THEN GOSUB60:HPAINT(X1,Y1
),8,3:GOSUB67:HPAINT(X1,Y1+24),8
,3:GOSUB67:HPAINT(X,Y),2,3:GOSUB
67:U=U+1:IFDG=0THENGOSUB32
24 ' Right move.
25 IF X1>X AND Y1=Y THEN 27 ELSE
 IF X-X1=48 ANDHPOINT(X1,Y1)=2 A
ND HPOINT(X1+24,Y)=2 AND HPOINT(
X,Y)=8 THEN GOSUB60:HPAINT (X1,Y
1),8,3:GOSUB67:HPAINT(X1+24,Y),8
,3:GOSUB67:HPAINT(X,Y),2,3:GOSUB
67:U=U+1:IFDG=0THENGOSUB32
26 ' Left move.
27 IFX1-X=48 ANDY1=Y AND HPOINT(
X1,Y1)=2 ANDHPOINT(X1-24,Y)=2 AN
D HPOINT(X,Y)=8 THEN GOSUB60:HPA
INT(X1,Y1),8,3:GOSUB67:HPAINT(X+
24,Y),8,3:GOSUB67:HPAINT(X,Y),2,
3:GOSUB67:U=U+1:IFDG=0THENGOSUB3
2
28 IFU=31 THEN U=0:FORT=1TO5:SOU
ND100,1:SOUND150,1:SOUND180,1:NE
XTT ELSE IFU=31 THEN RETURN
29 IF V<>R THEN RETURN ELSE IFMI
<10 THEN MI$=RIGHT$(STR$(MI),1):
MI$="0"+MI$ ELSE MI$=RIGHT$(STR$
(MI),2)
30 HCOLOR1,0:GOSUB70:HCOLOR2,0:G
OSUB72:FORT=1TO3000:NEXTT:HCOLOR
1,0:GOSUB72:MI=0:MI$="":GOSUB66:
HCOLOR8,0:GOSUB70:RETURN
31 ' Check if there are any jump
s left.
32 IFU<6 ORU=31THENRETURN
33 A=0:FORT=28TO172STEP24:FORF=8
2TO226STEP24:A=A+1:H(A)=HPOINT(F
,T):NEXTF,T
34 FORT=1TO9:IFH(G(T))=8 THEN35
ELSEIFH(G(T)+1)=2 ANDH(G(T)+2)=8
 THENRETURN ELSEIFH(G(T)-1)=2 AN
DH(G(T)-2)=8 THENRETURN ELSEIFH(
G(T)+7)=2 ANDH(G(T)+14)=8 THENRE
TURN ELSEIFH(G(T)-7)=2 ANDH(G(T)
-14)=8 THENRETURN
35 NEXTT
36 FORT=10TO19:IFH(G(T))=8 THEN3
7 ELSEIFH(G(T)+1)=2 ANDH(G(T)+2)
=8 THENRETURN
37 NEXTT
38 FORT=20TO29:IFH(G(T))=8 THEN3
9 ELSEIFH(G(T)-1)=2 ANDH(G(T)-2)
=8 THENRETURN
39 NEXTT
40 FORT=30TO39:IFH(G(T))=8 THEN4
1 ELSEIFH(G(T)+7)=2 ANDH(G(T)+14
)=8 THENRETURN
41 NEXTT
42 FORT=40TO49:IFH(G(T))=8 THEN4
3 ELSEIFH(G(T)-7)=2 ANDH(G(T)-14
)=8 THENRETURN
43 NEXTT
44 X=154:Y=99:HCOLOR1,0:GOSUB70:
GOSUB66:HCOLOR2,0:L=32-U:IFL<10T
HENL$=RIGHT$(STR$(L),1):L$="0"+L
$:GOSUB71 ELSE L$=RIGHT$(STR$(L)
,2):GOSUB71
45 FORT=1TO3000:NEXTT:GOSUB67:HC
OLOR1,0:GOSUB71:HCOLOR8,0:GOSUB7
0
46 P$=INKEY$:IFP$=""THEN46 ELSEI
FP$=" "THENGOSUB67:GOTO6 ELSE IF
 PEEK(343)-191 THENGOSUB67:GOTO1
0 ELSE46
47 ' Title screen inkey function
s.
48 DG=0:TM=0:P$=INKEY$:IFP$=" "T
HENHCOLOR1,0:GOSUB69:HCOLOR4,0:G
OSUB76:DD=1:GOTO6
49 IFP$>"0"ANDP$<"6"THEN54
50 HCOLOR7,0:GOSUB69
51 IFP$="T"THENDG=1:HCOLOR1,0:GO
SUB69:GOTO57
52 HCOLOR2,0:GOSUB69:GOTO48
53 ' Demonstration games.
54 DG=1:U=0:DS=1:HCOLOR1,0:GOSUB
69:HCOLOR8,0:GOSUB75:GOSUB6:GOSU
B66:P=VAL(P$):FORD=1TOZ(P):X1=K(
A(P,D)):Y1=L(A(P,D)):X=K(B(P,D))
:Y=L(B(P,D))
55 FORT=1TO50:NEXTT:GOSUB19:NEXT
D:GOSUB66:FORT=1TO3000:NEXT:DS=1
:GOSUB6:GOSUB66:DG=0:HCOLOR1,0:G
OSUB75:GOTO48
56 ' Teaching mode.
57 V=1:HCOLOR2,0:GOSUB77
58 N$=INKEY$:N=VAL(N$):IFN$=""OR
N<1 ORN>5 THEN58ELSE R=Z(N)+1
59 HCOLOR1,0:GOSUB77:GOSUB73:GOS
UB69:HCOLOR2,0:GOSUB74:HCOLOR4,0
:GOSUB76:DS=1:GOSUB6:DD=1:TM=1:G
OTO8
60 IF TM=0 THENRETURN
61 ' Check if correct move.
62 HCOLOR2,0:IFX1=K(A(N,V)) AND
Y1=L(A(N,V)) AND X=K(B(N,V)) AND
 Y=L(B(N,V)) THEN V=V+1:W=0:RETU
RN
63 MI=MI+1:W=W+1:X1=0:IFW=3 THEN
HCOLOR8,0:HLINE(K(A(N,V))+3,L(A(
N,V))-5)-(K(A(N,V))+5,L(A(N,V))-
3),PSET,B:HCOLOR2,0:HLINE(K(B(N,
V))+3,L(B(N,V))-5)-(K(B(N,V))+5,
L(B(N,V))-3),PSET,B:X=K(A(N,V)):
Y=L(A(N,V)):W=0
64 GOSUB66:GOTO9
65 ' Gosubs, Gosubs, Gosubs.
66 POKE140,5:FORG=1TO2:FORK=1TO1
0:EXEC:NEXTK:FORL=1TO20:NEXTL,G:
RETURN
67 POKE140,200:FORT=1TO4:EXEC:NE
XTT:RETURN
68 POKE140,9:FORT=1TO4:EXEC:NEXT
:RETURN
69 HPRINT(26,3),"PRESS SPACEBAR"
:HPRINT(26,5),"TO PLAY A GAME":H
PRINT(1,3),"PLEASE  MAKE":HPRINT
(0,5),"YOUR SELECTION":HPRINT(1,
18),"PRESS [T] FOR":HPRINT(1,20)
,"TEACHING MODE":HPRINT(26,18),"
NUMBERS: 1 - 5":HPRINT(26,20),"F
OR DEMO GAMES":RETURN
70 HPRINT(3,23),"PRESS F1 AT ANY
 TIME FOR MAIN MENU":RETURN
71 HPRINT(4,23),"NO MORE MOVES."
:HPRINT(19,23),L$:HPRINT(22,23),
"PEGS REMAINING":RETURN
72 V=1:HPRINT(3,23),"GAME IS DON
E. YOU MADE":HPRINT(26,23),MI$:H
PRINT(29,23),"MISTAKES":RETURN
73 HPRINT(17,0),"COCO-Q":RETURN
74 HPRINT(2,0),"LET'S LEARN HOW
TO PLAY GAME NUMBER":HPRINT(37,0
),STR$(N):RETURN
75 HPRINT(9,23),"NOW PLAYING DEM
O GAME ":HPRINT(31,23),P$:RETURN
76 HPRINT(0,3),"USE ARROW KEYS":
HPRINT(0,5),"TO MOVE CURSER":HPR
INT(26,3),"PRESS: [ENTER]":HPRIN
T(26,5),"ON JUMPING PEG":HPRINT(
1,18),"PRESS [ENTER]":HPRINT(1,2
0),"ON EMPTY HOLE":HPRINT(26,18)
,"PRESS SPACEBAR":HPRINT(26,20),
"FOR A NEW GAME":RETURN
77 HPRINT(8,23),"PRESS 1-5 TO SE
LECT GAME":RETURN
78 LOCATE8,12:PRINT"PLEASE WAIT
LOADING DATA";:RETURN
79 ' Read data for demo & teachi
ng games
80 FORM=1TO5:Z(M)=VAL(MID$("3128
302924",M*2-1,2)):FORD=1TOZ(M):R
EADA(M,D),B(M,D):NEXTD,M:FORM=1T
O49:READG(M):NEXTM
81 C=0:FORT=130TO178STEP24:C=C+1
:K(C)=T:L(C)=27:K(C+3)=T:L(C+3)=
51:K(C+27)=T:L(C+27)=147:K(C+30)
=T:L(C+30)=171:NEXT
82 C=6:FORT=82TO226STEP24:C=C+1:
K(C)=T:L(C)=75:K(C+7)=T:L(C+7)=9
9:K(C+14)=T:L(C+14)=123:NEXT:RET
URN
83 DATA 19,17,16,18,28,16,25,23,
33,25,18,30,31,33,33,25,26,24,29
,17,6,18,13,11,10,12,27,13,13,11
,18,6,8,10,1,9,16,4,3,1,1,9,10,8
,7,9,6,4,21,7,22,24,24,10,10,8,7
84 DATA 9,4,16,15,17,15,17,4,16,
17,15,14,16,7,9,16,4,1,9,10,8,3,
1,6,4,1,9,8,10,11,9,13,11,18,6,2
7,13,26,12,13,11,6,18,25,11,33,2
5,24,26,31,33,28,30,33,25,26,24
85 DATA 23,25,21,23,19,17,30,18,
17,19,20,18,27,25,18,30,33,25,24
,26,31,33,28,30,33,25,26,24,6,18
,13,11,18,6,3,11,10,12,1,3,4,6,3
,11,12,10,16,28,21,23,28,16,7,21
86 DATA 8,22,21,23,24,22,9,23,22
,24,5,17,12,10,17,5,2,10,3,11,10
,12,13,11,18,6,27,13,26,12,13,11
,6,18,25,11,33,25,24,26,31,33,28
,30,33,25,26,24,8,10,1,9,10,8,16
,28,21,23,28,16,7,21,8,22,21,23,
23,9
87 DATA 15,17,18,16,5,17,12,10,3
,11,10,12,8,10,1,9,10,8,7,9,16,1
8,29,17,28,16,21,23,16,28,31,23,
25,11,12,10,10,24,27,25,24,26,33
,25,26,12,13,11
88 DATA 17,18,19,24,25,26,31,32,
33,3,10,15,16,22,23,29,30,38,45,
5,12,20,21,27,28,34,35,40,47,3,4
,5,10,11,12,15,16,20,21,29,30,34
,35,38,39,40,45,46,47
89 WIDTH80:CLS3:ATTR3,2:POKE4159
8,3:POKE65496,0:STOP
```

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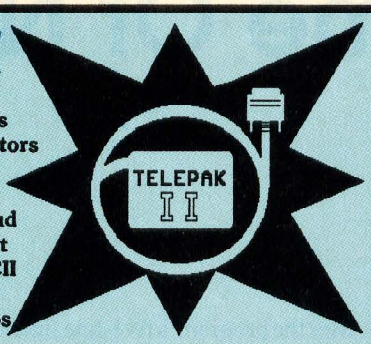

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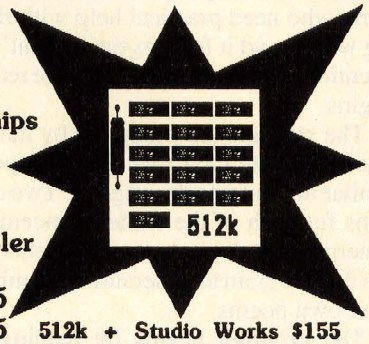

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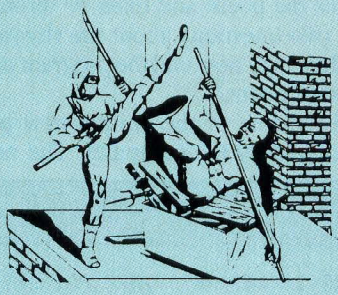
Warrior King	$29.95*
Kung-Fu Dude	$24.95
In Quest of the Starlord	$34.95*
Hint sheet for Starlord	$3.95
Pyramix	$19.95*
Hall of the King 1 2 or 3	$29.95
Dragon Blade	$19.95
White Fire of Eternity	$19.95
Paladin's Legacy	$24.95

* CoCo 3 only



Kyum-Gai: to be Ninja

As the Ninja Gai-Dan, you must find and destroy evil forces, use a multitude of martial arts moves to defeat your enemies, obtain treasures & weapons, and evade obstacles! Kyum-Gai: to be Ninja uses the most detailed 320x200, 16 color graphics, the highest quality digital sound effects and spectacular animation!

CoCo 3, disk, & joystick .. $29.95

Multi-Label III Version 2.00

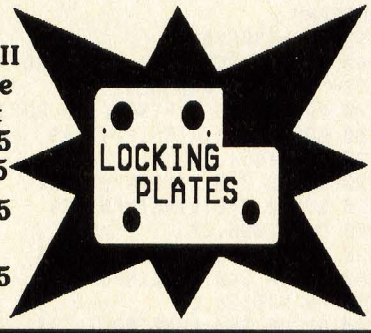
This latest version of Multi-Label III now prints labels one, two or three across! Comes configured for most Tandy and Epson printers .. $16.95
Upgrades to Version 2.00 .. $6.95

Fkeys III (CoCo 1,2, 3) $19.95

Easy to use, DOS mods, 20 function keys

Sixdrive (CoCo 1,2, 3) $16.95

Use up to 3 d/s drives as 0,1 2,3 4,5.



MPI-CoCo Locking Plates

This money saving device is now available for the CoCo 2 and 3! It is important when ordering to specify CoCo 2 or 3 and MPI 26-3024 or 26-3124. Only $7.95

Suprfile III (CoCo 3 only) $29.95

Easy to use, multi-purpose database.

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To Rhyme Or Not To Rhyme

by Steve Blyn
Contributing Editor

This month's article concerns a sometimes misunderstood area of language arts — poetry. Children and adults often think of it as dull. I often find that boys in particular cringe when poetry is mentioned. As usual, I have found success with this problem by presenting it as an enjoyable project.

Poetry presents a silly poem and gives users an opportunity to create similar poems of their own. My poem rhymes, but of course this is not a criterion for a poem. In fact, many of the best do not rhyme. However, I enjoy those that rhyme and have found most children appreciate them too.

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees, and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

After the program's five-line limerick is presented, two questions are asked about the words that rhyme. This exercise is for those who need practical help with rhyming words, and it focuses the student's full attention on the program. Now, the real fun begins.

The students are prompted by the program to create their own five-line poems similar in format to the original. Two questions for each of the students' poems are generated by the program. Students may use this program to generate any number of their own poems.

The program begins by reading and printing the original poem. Line 30 sends the program to lines 370 through 430 to get the given lines and rhyme words. Line 60 prints the poem and lines 70 through 130 ask two questions about the rhymes. The student may now end the program or create another poem.

Each line of the child's new poem is prompted by the computer. The new line replaces the corresponding line from the previous poem on the screen as well as in the computer program. Lines 180 through 320 do the prompting for the child's original five-line poem and the rhyming words. When the poem is completed, the program runs itself once again with the new poem.

The original poem is read only on the initial running. Line 330 sends the program to Line 40 rather than to Line 50 every other time a poem is created. This ensures that the poem just created, rather than the original, is the one that is used by the computer.

It is fairly easy to modify the program to meet your child's needs. After studying it you may want to write a similar one with a different rhyme pattern or a different number of lines. My method of organization includes having one string stand for one line of poetry. For example, A$ represents the first line, and E$ represents the fifth line. Be careful to remove or add more strings to the program accordingly if the number of lines is altered. ❑

16K ECB

The listing: POETRY

```
10 REM"CREATING FUN POETRY"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1989"
30 CLEAR 2000:GOSUB 380
40 CLS5:PLAY"L50CEGECCC"
50 PRINT@11,"POETRY";:PRINT@64,"
";
60 PRINT A$:PRINT B$:PRINT C$:PR
INT D$:PRINT E$
70 PRINT@320,"WHICH WORD RHYMES
WITH ";:PRINT D1$;"?":LINEINPUT
AN$
80 IF AN$=C1$ THEN PRINT@362,"CO
RRECT":PLAY"L70CDEFGGGG"
90 IF AN$<>C1$ THEN PRINT@362,"S
ORRY, ";C1$:PLAY"L4D-"
100 PRINT@352,"":PRINT@320,"WHIC
H WORD RHYMES WITH "A1$"
110 PRINT"AND ";E1$;"? ";:LINEIN
PUT AN$
120 IF AN$=B1$ THEN PRINT@372,"C
ORRECT":PLAY"L70CEDFGGG"
130 IF AN$<>B1$ THEN PRINT@372,B
1$:PLAY"L4D-"
140 PRINT@416,"PRESS C TO CREATE
 YOUR OWN POEM OR E TO END THE P
ROGRAM"
150 EN$=INKEY$
160 IF EN$="C" THEN 170 ELSE IF
EN$="E" THEN 440 ELSE 150
170 PRINT@320,STRING$(160,207);
180 GOSUB 340:LINEINPUT A$
190 PRINT@64,A$
200 GOSUB 350:LINEINPUT A1$
210 GOSUB 340:LINEINPUT B$
220 PRINT@96,B$
230 GOSUB 350:LINEINPUT B1$
240 GOSUB 340:LINEINPUT C$
250 PRINT@128,C$
260 GOSUB 350:LINEINPUT C1$
270 GOSUB 340:LINEINPUT D$
280 PRINT@160,D$
290 GOSUB 350:LINEINPUT D1$
300 GOSUB 340:LINEINPUT E$
310 PRINT@192,E$
320 GOSUB 350:LINEINPUT E1$
330 GOTO 40
340 PRINT@320,STRING$(128,207);:
PRINT@320,"WRITE A LINE OF POETR
Y":RETURN
350 PRINT@384,STRING$(64,207);:P
RINT@384,"WHAT'S THE LAST WORD O
N THE LINE";:RETURN
360 REM** THE ORIGINAL POEM ONLY
 GETS READ ON THE INITIAL RUN OF
 THE PROGRAM
370 REM**** THESE ARE  ORIGINAL
POEM LINES AND RHYMES
380 A$="I WENT TO SEA IN A BOAT"
:A1$="BOAT"
390 B$="WITH ALL THAT I COULD TO
TE":B1$="TOTE"
400 C$="WITH BAGGAGE AND BOXES":
C1$="BOXES"
410 D$="AND EVEN TWO PAIR OF FOX
ES":D1$="FOXES"
420 E$="SOON,I HAD NO ROOM LEFT
TO FLOAT":E1$="FLOAT"
430 RETURN
440 END
```

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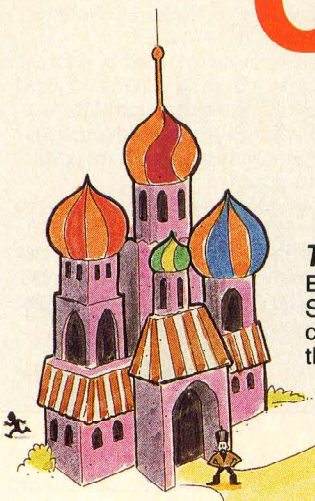
Here's your ticket to a fun, fabulous world of adventure, thrills and intrigue! Come to Radio Shack for the best in games for your Color Computer. It's as much fun as an amusement park—and no waiting in lines!



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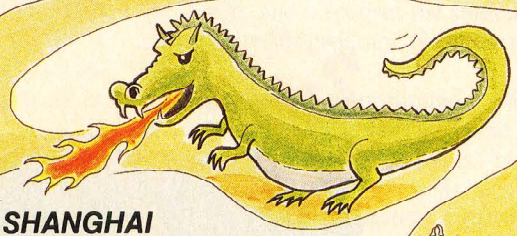

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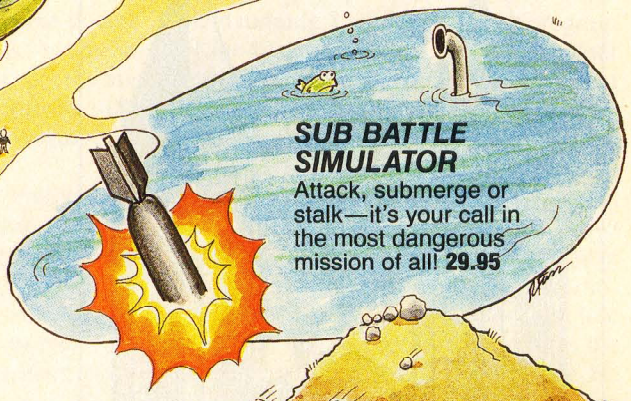

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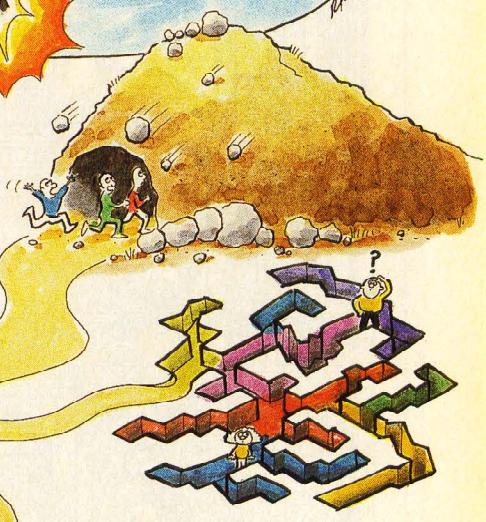

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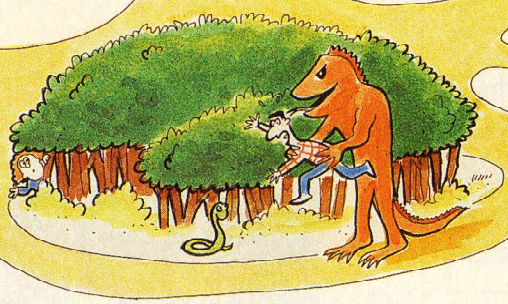
Take control of a Super Dogfighter to keep the galaxy free! **29.95**



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CoCo Gallery

SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also please include a few facts about yourself.

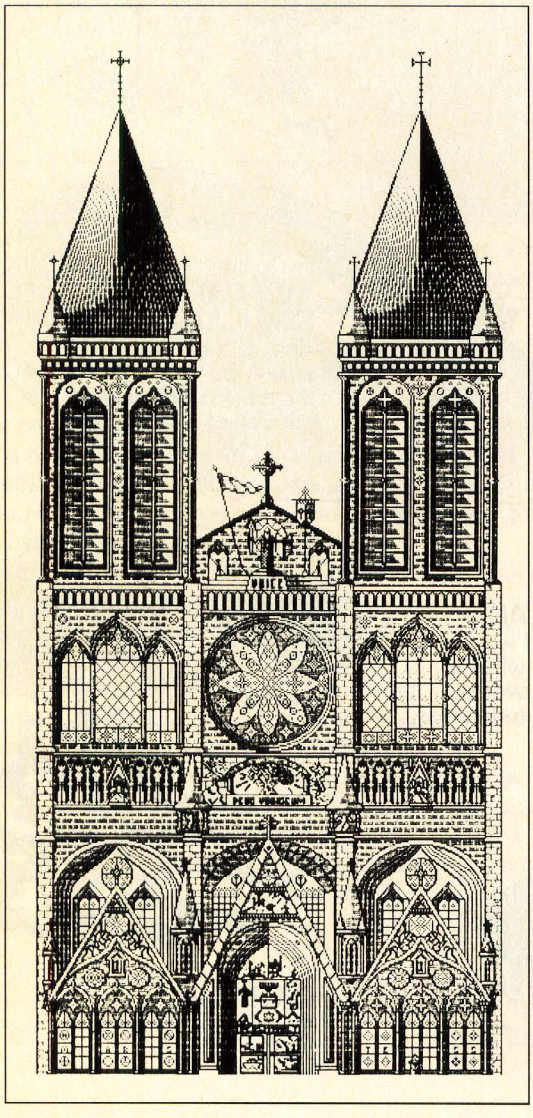
Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is not an original work.

We will award one first prize of $25, one second prize of $15 and one third prize of $10.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

—Tony Olive, Curator

1st Place



The Lins Cathedral
Leighton L. Verkist

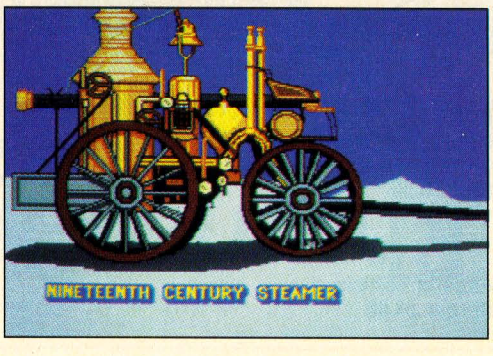
Designed and created by Leighton for his two friends Teresa and Marcia Lins, using a Color Computer 3, Star SG 10 printer and the *Color Max* program. He is a master's degree candidate at Western Washington University in theater lighting and lives in Ferndale, Washington.

2nd Place

Sunset **Wally Mayer**

Wally, of Hamilton, Ohio, produced this tranquil scene using *Color Max 3*. In addition to creating graphics, his many hobbies include archery, horseshoes, leather tooling, oil painting, guitars and country music.

3rd Place



Steamer
Jim Noah

Jim is a recently retired firefighter with the Fort Worth fire department. His hobby B.C.(Before CoCo) was art. Now, with the CoCo 3 and *CoCo Max III*, he has drawn over 80 old and new fire stations, plus several pictures of apparatus.

The World's First

by Don Hutchison
Contributing Editor

Forum Message 53775, posted on the 18th of September in the CoCo SIG, announced that the world's first fully functional 1-Meg CoCo 3 booted into OS-9 Level II, running perfectly at 10:15 p.m.!

Using custom hardware built by **Tony DiStefano** (DISTO) and standard OS-9 Level II with two minor changes to `OS9p1` and `GrfDrv` by **Kevin Darling** (OS9UGPRES), the entire project only took about a dozen hours to complete, from design to debugging (over the phone).

The hardware implements an external DAT (Dynamic Address Translator) extension, with video addressing available throughout the 1-Meg addressing range. Naturally it's all invisible to the OS-9 user except that free memory is much larger. A 2-Meg design might be available in the future if there is a demand for it.

The software requires a few simple patches in OS-9. Kevin and Tony admit to being just a little surprised that the modifications were not too difficult. The first attempt didn't use a patched `GrfDrv`, and windows were functional when this was corrected.

This first version requires a person to solder a daughterboard on top of the 6809 CPU. Your original 512K upgrade plugs into a custom 512K replacement board, so that part is easy. Cost figures are not yet available, but look for MegaCoCo at the Somerset RAINBOWfest.

Congratulations to SIG members DISTO and OS9UGPRES.

Don Hutchison is an electrical engineer and lives in Birmingham, Alabama. He works as a senior project engineer involved in the design of industrial control systems. On Delphi, Don is the Database Manager of the RAINBOW CoCo SIG. His Delphi username is DONHUTCHISON.

Database Graphics

Interest in the graphics and pictures available in our databases has always been high. It's only natural for questions to arise from time to time. As one SIG member asked recently, "I am exposed to all kinds of graphics formats on Delphi and I'd like to understand RLE, MGE, CM3 and VEF. Being a CoCo 1 owner, I understand `PMODE 4`, but have no where to go to get information on the other formats. Can you help?"

Sure. The various graphics formats are produced by whichever graphics editor is being used. *Color Max 3*, for example, produces files with an MGE extension, while *CoCo Max III* produces files with a CM3 extension. RLE-formatted files are specially-encoded files that can be used to recreate a `PMODE 4` picture, while VEF pictures are image files used with OS-9 Level II on a CoCo 3.

Additional utilities for viewing such pictures are available in the databases of the OS-9 Online and CoCo SIGs. A utility called `RLEBIN`, for example, can be used on your CoCo 1 to view (and convert to binary format) any pictures in the RLE format.

I suspect the main difficulty is that all of the various graphics on Delphi simply can't be displayed on the CoCo 1. It just doesn't

Database Report

by Gregory A. Law
OS-9 SIGop

General Information: **Chris Burke** (COCOXT) posted a brief article discussing hard disk fragmentation and some of the ways that it can be reduced.

Applications: **Mike Atwood** (ORANGECRUSH) contributed Version 2.2 of the popular *Sled* text editor including documentation and source code. **Mike Sweet** (DODGECOLT) submitted Version 1.5 of the *Ed* word processor that adds formatting, pop-up menus and onscreen file picking. **Zack Sessions** (ZACKSESSIONS) posted Version 2.0 of *Banner Maker*, which uses internal font definitions. **Kevin Donnelly** (KDONNELLY) contributed Version 1.3 of *Envelope Printer* to print envelopes for *CoCo 3 Graphics Designer*.

Utilities: **Jay Truesdale** (JAYTRUESDALE) submitted a utility to recursively scan a device or directory structure changing all filenames to lowercase and directory names to uppercase. **Roger Krupski** (HARDWAREHACK) posted an enhanced version of **Kevin Darling**'s (KDARLING) `dmode` utility. Mike Atwood contributed the `mroff` text formatter that works with virtually all printers and word processors. Kevin Darling submitted `wdir`, which gives detailed information on each of the windows that are being used, and `gpmap`, which gives detailed information on each of the get/put buffers in use. **Dennis Skala** (DENNYSKALA) posted a *Shell+* subroutine to get the name of the next available window into a *Shell+* variable.

have the ability to display an MGE picture, for example, because that format requires the additional hardware of a CoCo 3.

Guide to Delphi

Have you ordered your Delphi guide yet? *Delphi: The Official Guide*, by **Michael A. Banks** (KZIN) is a 500-page book designed to get you up and running on Delphi and serve as a continuing reference. In its pages you'll find everything you need to know to get the most from your time on Delphi. It is a complete resource to Delphi services. The manual includes descriptions of menus, time-saving tips for the advanced user, an index of Delphi services, a dial-up guide, technical reference section, troubleshooting guide, glossary of terms, and a command reference card.

From the main menu you can order *Delphi: The Official Guide* for $19.95 plus $3 for shipping and handling. You may also purchase the guide at many fine bookstores, including B. Dalton, Coles and Waldenbooks.

New Payment Plan

Coming soon is EasyPay, Delphi's new payment plan. A member may now pay his or her Delphi bill directly from his checking account without ever writing a check.

In order for you to participate in EasyPay, you must have a checking account in a bank that is a member of an automated clearing house (ACH). Most banks in the United States are members of an ACH. If you're unsure, check with your bank.

There are no start-up or annual fees. However, in any month that you owe from one to 99 cents, Delphi debits your account for a minimum of $1. If you owe nothing, no withdrawals are made.

Your checking account is debited for online usage on the fifth business day of each month and two weeks thereafter. You may review all debit activity online by typing `GO EASY` from almost any prompt. This area is also available under the Using Delphi menu. Introductory information, the agreement, and how to request an agreement are in this area.

Zack Sessions contributed a utility to delete all files in a directory without deleting the directory itself. Mike Sweet submitted a print spooler that will print multiple files as specified on the command line. **Ezra Story** (EZY) posted a utility to strip Xmodem pad characters from *PAK* archive files. **Tim Koonce** (TIMKOONCE) has been a busy little bee this month uploading several commands that have been ported from UNIX systems by Simmule Turner. These include `shar`, a utility used for merging text files for transmission through electronic mail; `tar`, which archives any number of files including entire directory trees for easy transfer to other systems; and `compress`, which compresses single files.

Patches: Mike Sweet posted a patch for the Disto SCSI driver to operate two hard drives on the same cable and a patch to fix a bug in *Ed* Version 1.5 in which a line disappears if you delete the last line in a file. **Jim Hickle** (JIMHICKLE) contributed a patch to allow *Home Publisher* to print to a disk file.

Telcom: Phil Zeigler (PHILZEIGLER) submitted Version 2.8 of *OSTerm* written by Vaughn Cato. This version fixes a couple of minor problems that were found in the previous version.

Graphics & Music: **Jim Buck** (COCOROGUE) has posted a total of 11 musical scores for *UltiMusE III*, including such favorites as "A Horse With No Name," "Heart of Gold," "Sundown," and "Take it to the Limit." Zack Sessions contributed a two-dimensional *Rubik's Cube* puzzle. **Pete Ellisson** (PETEELLISSON) submitted a viewer for Rascan images. **Mike Schneider** (MSCHNEIDER) posted 10 Macintosh sound files from *Star Trek*, *Casablanca*, *ET* and *Bugs Bunny*. **John Kou** (BAMBOO) contributed 10 more *UltiMusE III* scores, including "Let There Be Praise," "Lift Up The Lord," and "America Medley." **Brian Wright** (POLTERGEIST) submitted GIF images of a girl in a bikini, a Klingon cruiser, and an image from the movie *Blame it on Rio*.

Programmers Den: Mike Sweet contributed a `cgfx` compatible library with new functions for onscreen file selection and menu selection. **Mark Farrell** (XLIONX) submitted an update to his concurrent compiler executive for the Microware C Compiler and a patch to fix a bug in it.

CoCo SIG

General Information: **Jeff Shearman** (AIRBORNE) posted a patch for *WordPower* Version 3.2 so that it will work with 40-track drives. Chris Burke contributed a bulletin describing how to use *HYPER-I/O* Version 2.6B with the new model hard disk controller (WD XT-GEN) and also giving an example of how to determine which MSA is assigned to a disk handle.

CoCo 3 Graphics: **Donald Ricketts** (STEVEPDX) has uploaded 12 DS-69B digitized images from the International Swimsuit Edition. **Richard Trasborg** (TRAS) contributed some scenes from the tennis courts in 640 format, including a viewer for the pictures. **Tommie Taylor** (TOMMIETAYLOR) submitted several GIF images for use with the `CC3GIF.BIN` viewer.

Utilities & Applications: **James Wilcox** (2USER) uploaded *Record Keeper* Version 5.03 for the CoCo 3, including a ledger, phone book and journal with password protection. **Fred McDonald** (FREDMCD) posted a program that will copy, kill, list and backup files from one disk to another with a single keystroke. **Kenneth Wuelzer** (WUELZERKEN) contributed *KLOCK II*, which will password encrypt and decrypt disks for data security. **Eric Stringer** (NES) submitted an electronics calculator that can calculate such formulas as resistance, inductance, capacitance (RLC), Delta to Y and others. **John Malon** (JOHNLM) uploaded a new version of *TestMaker* that works on the CoCo 3.

Classic Graphics: **Frances Calcraft** (FRANCALCRAFT) posted a patch for Ricker and Smith's Atari Koala picture viewer for use with a CoCo 3 and RGB monitor.

Music & Sound: **Mike Carey** (SPOOLFRAME) contributed a program that will convert *Musica* format files to *Lyra* format.

Archives: **Jeffrey Parker** (JEFFPARKER) uploaded the transcript of the *CoCo Publisher* conference held on August 17th.

Telecommunications: **Eric Bursley** (BACCHANALIAN) posted detailed information on the Zmodem transfer protocol.

❑

Forum Tip

A SIG member asks, "I haven't read my messages in the CoCo SIG for a while and now I have several hundred new messages I want to read. I usually use the READ NEW NS command to read my messages, but the buffer in my terminal program doesn't have the capacity to hold several hundred messages. Is there a way for me to read only a limited number of messages?"

Yes, there is! The command:

READ *xxxx:yyyy* NS

works in Forum to allow you to read a block of messages nonstop. Just set *xxxx* to the starting message number and *yyyy* to the ending message number. (The NS means nonstop.)

CoCo Conferences

Joining the lineup in the CoCo SIG's regularly scheduled conferences is Jeffrey S. Parker, whose monthly topic is "The CoCo Publisher." Jeffrey focuses on CoCo desktop publishing and writing for RAINBOW Magazine. He is a freelance writer who has been working with computers since 1975 and with the Color Computer since 1981. Currently he is Director of Computer Education at the Parker Academy in Sudbury, Massachusetts, as well as a lecturer in technical communications at Northeastern University.

The Delphi guide serves as a continuing reference and helps you get the most from your time online.

Jeffrey has written more than a hundred reviews and articles on the Color Computer, so if you've been considering the potential of desktop publishing with the CoCo, or if you have an idea for an article for RAINBOW magazine, join Jeffrey and others on the third Wednesday of each month in CoCo Conference!

RAINBOW Staff Change

A familiar figure among Color Computer users has a new title. Greg Law, who has been the SIGop and database manager of our OS-9 SIG on Delphi for more than two years, is now technical editor for RAINBOW Magazine!

Greg began work at THE RAINBOW on August 14 and the magazine's new managing editor, Cray Augsburg, says, "I'm absolutely delighted that Greg agreed to join our full-time staff here in Prospect, Kentucky. He's a veteran CoCo user and well-known in the CoCo Community, particularly among telecommunicators."

Prior to joining Falsoft, Greg was a computer technician in Georgia, and his background includes a fanatical interest in both programming and hardware, with particular interest in the 6809 microprocessor. He programs primarily in C and assembly, and his hardware background ranges from the Color Computer to mainframes and networking systems.

Look for Greg on Delphi's OS-9 SIG almost any evening.

— Don Hutchison

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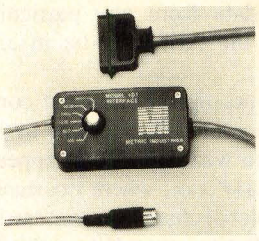
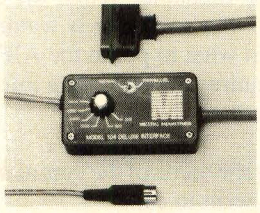


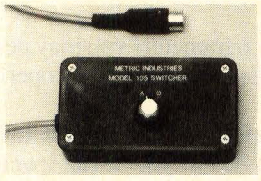
Model 101
Serial to Parallel Printer Interface

★ Works with any COCO
★ Compatible with "Centronics" Parallel Input Printers
★ Just turn the knob to select any one of 6 baud rates 300-9600
★ Comes complete with cables to connect to your printer and computer
★ Can be powered by most printers



Model 104 Deluxe Interface with "Modem Switch"

★ **Same Features as 101 Plus**
★ Built in Serial Port for your Modem or other serial device
★ Switch between Serial Output and Parallel Output
★ Comes with cables to connect to your computer and printer
★ Can be powered by most printers



Model 105 Serial Switch

★ Connects to your COCO to give you 2 switch selectable Serial Ports
★ Comes with a 3 foot cable to connect to your computer
★ Now you can connect your Printer (or printer interface) and your Modem (or other serial device) to your COCO and flip the switch to use either device
★ Does not require power

Cassette Label Printing Program

★ **New Version 2.1 prints 7 lines** of information on Cassette labels
★ Comes on Tape with instructions to transfer to disk
★ Menu driven, very easy to use
★ **Save and Load Labels from Tape and Disk**
★ Uses the features of your printer to print standard, expanded, and condensed characters
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★ Allows editing of label before printing
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Tandy addresses Multi-Vue's average end-user

Multi-Vue And Pre-existing Applications

by Tandy Home Computer Software Group

Inasmuch as the documentation for *Multi-Vue* has been written in a reference style more suited to the needs of a programmer than to the needs of the average end-user, we have prepared the following article to help this type of user obtain greater usefulness and pleasure from *Multi-Vue*.

Basically the things a person needs to know in order to make use of *Multi-Vue* for pre-existing software are as follows:

- The basics of OS-9 windows
- How to design an AIF (Application Information File)
- How to design an icon file and set its attributes
- A little about BASIC09 to help facilitate Step 3 above

OS-9 Window Basics

There are six types of OS-9 windows with which we need to concern ourselves in our excursion into the world of *Multi-Vue*. They are (and this is taken straight from Page 9-34 of the BASIC09 reference section of the OS-9 Level II documentation):

- A 40-by-24, 16-color text window requiring 1.6K of memory
- An 80-by-24, 16-color text window requiring 4K
- An 80-by-24, 2-color graphics window requiring 16K
- A 40-by-24, 4-color graphics window requiring 16K
- An 80-by-24, 4-color graphics window requiring 32K
- A 40-by-24, 16-color graphics window requiring 32K

The 40-by-24 graphics windows have a 320-by-192 dot resolution for graphics purposes and a 40-by-24 character resolution for text purposes. The 80-by-24 graphics windows, similarly, have 640-by-192 and 80-by-24 resolutions for graphics and text, respectively.

Two things need to be kept in mind when selecting a window for an application under *Multi-Vue*. First, text windows cannot be sized by an AIF. That is, a text window always takes up a full screen, no matter what size you specify for it. Secondly, while graphics windows may be sized to fit on screen with several other windows at the same time, some applications may have a required minimum size and might not function properly in a smaller window. So be aware of this when we construct an AIF in the next section.

Application Information Files

An AIF is a short text file (nine lines, to be exact) that tells *Multi-Vue* to associate an icon with a particular application, how much memory is required to run the application, and the type and size of window to display the output in.

To create an AIF, use the `edit` command under OS-9. AIFs should be in the same directory from which your program may take data, if any. If the program does not need to input data from any particular directory, then the AIF may be in any directory.

At the OS-9 prompt use the `chd` command to change your data directory to the one in which you want the AIF to appear. Then type `edit aif.xxx`, where `xxx` stands for any legal triplet of characters that can be used in an OS-9 filename. When the E: prompt appears, the computer is waiting for input to tell it what to put in the AIF.

Each AIF requires the following information in this order:

Line 1: contains the name of the command or program you want to call.

Line 2: lists any parameters you may need to pass for the application to run properly.

Line 3: is the pathlist to the icon file to be displayed by the AIF. If you do not specify a full pathlist including the device name from which to call the icon, *Multi-Vue* considers the pathlist as being in the current execution directory, wherever that may be — usually `/d0/cmds`.

Line 4: tells *Multi-Vue* how many pages of memory to allocate for the application you are calling. There are four pages per 1K of memory. For most programs the standard

32 pages (8K), which OS-9 allocates by default, is more than sufficient. However, large programs such as *Rogue*, *DynaCalc* or BASICO9 require considerably more. A value of 0 allocates the default amount of memory.

Line 5: tells *Multi-Vue* the type of window in which to display the program. This number is the same as that given in the -s= specification of the OS-9 `wcreate` command.

Line 6: specifies the minimum width of the window for your program in character units. There are two types of window, text and graphics. Text windows always take up a full screen, whereas you can use lines 6 and 7 of the AIF to tell *Multi-Vue* to start graphics windows at a smaller size and later make them larger if you want.

Line 7: gives the minimum length of the window for your application in screen lines, with the same notes as for Line 6.

Line 8: selects the palette slot for the window to use for the background color.

Line 9: selects the palette slot to use for the foreground color. The default colors are:

Slot	Color
0	White
1	Blue
2	Black
3	Green

and they can be changed by using the `display` command.

When you see the E: prompt in `edit`, press the space bar to insert a line, followed by the information you need on each line. Then press ENTER. For example:

```
E: dynacalc ENTER
E: ENTER
E: /d1/cmds/icons/icon.calc ENTER
E: 100 ENTER
E: 7 ENTER
E: 39 ENTER
E: 11 ENTER
E: 2 ENTER
E: 0 ENTER
```

When you have entered all nine lines, press Q and ENTER to leave `edit` and save the file.

Having edited an AIF, you now create an icon file to display so *Multi-Vue* will let you have access to your program.

Icons

The following information is included for those who are interested in some of the technical aspects of graphics display. This information is necessary to know in order to write a program like the `edic` procedure presented here. It is not necessary to know these things in order to use the program.

If you read Page 9-22 of the *Multi-Vue* documentation, you see that an icon file contains a 24-by-24 pixel four-color bit map. What that means is that the file contains data to create a picture that is 24 dots high by 24 dots wide in a four-color display mode. To accomplish this, the computer handles the information contained in a byte in a different fashion than normal. A byte in the computer's memory contains eight units of information called bits. Usually the byte is treated as a unit. That is, it is considered by the operating system as a single group of eight bits.

Each bit is either on or off, corresponding to a 1 or 0, respectively. A single bit by itself can only represent two possibilities. Therefore, by grouping them together in eights (to form bytes) you can get two raised to the eighth power, or 256 different states. Now, what the computer does — in the case of graphics data — is break the bytes in the data into smaller groups of bits.

In a two-color mode the byte is broken into eight groups of one bit each. For a four-color mode the byte is broken into four groups of two bits each, and in a 16-color mode the byte contains two groups of four bits each. Each group of bits in the byte controls a single dot (pixel) on the screen. Therefore in a four-color mode with which we are concerned, note there are two bits in each group. This means that each group can represent two raised to the second power, or four different states. (ie. a choice of four colors may be assigned to any given dot position.)

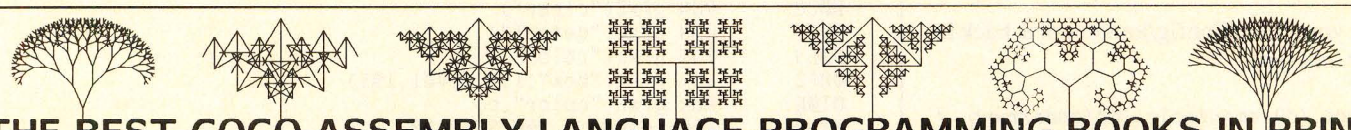
The computer checks the group in a byte that corresponds to a certain dot on the screen to see which state (0-3) is represented there. Then it goes to the palette register in memory with the same number, obtains the color data stored there and sets the dot to that color.

To draw an icon properly, it is necessary to know how many bytes we need to calculate and how to assign the number to each byte in order to create the proper pattern of colors.

First, our picture is 24 dots wide. In the four-color mode we are using, each byte controls four dots; therefore, we need 24/4, or six bytes to depict each row. Since there are 24 rows, it requires a total of 6-by-24=144 bytes to create the entire icon. To assign the correct number to the bytes involved, first make a plot or sketch of your icon on graph paper, noting which dots are to be which color. Suppose you had, for example, a pattern of four dots controlled by the same byte with colors as follows: 1-0-3-2. The possible bit setting in our two-bit groups are as follows:

Binary Value	Decimal Value
00	0
01	1
10	2
11	3

Now let's put our four groups together into a byte of data. The first group is 1,



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which corresponds to a group of 01. The next group is 0, a 00. Combining, we obtain 0100. The next group is 3, or 11. Combined with the previous two groups, this gives 010011. The final group is 2 or 10, which when combined yields 01001110. For computational purposes, the values of the bits in a byte from left to right are: 128, 64, 32, 16, 8, 4, 2 and 1, respectively. To obtain the value to put into the byte to create the pattern of colors we mentioned previously, add the values for the bits that are turned on. The bits in the byte we just constructed, which are turned on (1), correspond to the values 64, 8, 4 and 2. Adding these gives 64+8+4+2=78. Therefore, we need to make the value of the byte 78 to control the four dots we want. Repeat this procedure for the other 143 dot sections of your icon.

This is actually very simple once you have done it a few times, but it is also very time-consuming. To that effect, and in accord with the promise to make the package more user-friendly, we have included the listing of `edic`.

The Icon Editor

The `edic` program is intended to speed the editing of graphics icon files for *Multi-Vue*. To use the program, type the listing into the editor in BASIC09 by entering `edit edic` at the B: prompt. When the E: prompt appears, type in each line of the program, making sure to press the space bar for the first character on each line and pressing ENTER after each line. When you have finished entering the listing, the next step is to save and pack the program. Type `q` to exit the BASIC09 editor to the B: prompt. Type:

```
save edic ENTER
pack edic ENTER
```

Put the OS-9 system master disk back into `/d0` and type:

```
chx /d0/cmds ENTER
load merge ENTER
```

Put your Boot/Config/BASIC09 disk back in `/d0` and type:

```
merge /d0/cmds/edic /d0/cmds/runb /
d0/cmds/inkey /d0/cmds/gfx2 >/d0/cmds/
edic.file ENTER
```

(Note: This is one entire command and when typed will wrap around to the following line. Do not enter it as separate lines of text.)

If you are using an RGB monitor, type `montype r` and press ENTER to get a representation of the colors as they will appear under *Multi-Vue*. To run the program, boot OS-9. At the OS9: prompt type:

```
iniz w1 ENTER
merge sys/stdfonts >/w1 ENTER
wcreate /w1 -s=6 00 00 40 24 02 00 00
ENTER
shell i=/w1& ENTER
```

Now press the CLEAR key to see the new window. Put the `edic.file` disk in `/d0` and type:

```
chx /d0/cmds; load edic.file ENTER
edic ENTER
```

You are prompted for the background color for your icon. Your choice of responses is 0, 1, 2 or 3, which corresponds to the palette slots available in a four-color mode, into which the icons are intended to be mapped. Zero is white, 1 is blue, 2 is black and 3 is green. Type in the number corresponding to the color that will be the main color of your icon. This fills in the rectangle with that color. You can then begin editing individual pixels. A blinking dot appears in the upper-left corner of the icon image area. This can be positioned by using the I, comma, J and L keys to move up, down, left and right, respectively. To change the color of a pixel, position the cursor (blinking dot) in that location and press D, followed by the number of the palette slot containing the color you want to appear there. These numbers are the same ones used to select a background color.

When the image appears as you would like, press F to let `edic` know you are finished. After a few seconds you are prompted for the pathlist where the icon information will be filed. Type in the pathlist and press ENTER. After the file has been written, the OS9: prompt returns. You now need to use the `attr` command to turn on the execute and public execute attributes of the icon file so *Multi-Vue* will recognize it as a valid icon.

For example, suppose you stored your icon as `/d0/cmds/icons/icon.rogue`. Load the `attr` command by typing `load attr` at the OS9: prompt. Place the disk with the icon file in `/d0` and type:

```
attr/d0/cmds/icons/icon.rogue e
 pe
```

and press the ENTER key. When the OS9: prompt returns, the icon file is ready to use. Now, if you haven't done so already, all you need to do is edit an AIF to call the icon so it will appear on the screen. You can then use the icon to call the program associated with it.

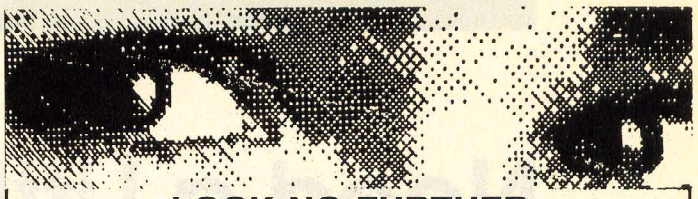
❑

512K OS-9 Level 2

The listing: `edic`

```
PROCEDURE edic
0000      DIM i,ic,q,r,s,path,x,y:INTEGER
0023      DIM icar(6,24),p(24,24),c:BYTE
0044      DIM ch:STRING[1]
0050      DIM fname:STRING[60]
005C      INPUT "Background color?",c
0075      FOR q=1 TO 24
0085        FOR r=1 TO 24
0095          p(q,r)=c
00A4        NEXT r
00AF      NEXT q
00BA      RUN gfx2("curoff")
00C8      RUN gfx2("clear")
00D5      RUN gfx2("defcol")
00E3      RUN gfx2("color",1)
00F3      RUN gfx2("box",159,0,401,191)
010B      RUN gfx2("color",c)
011D      FOR x=160 TO 390 STEP 10
0133        FOR y=0 TO 184 STEP 8
0148          RUN gfx2("bar",x,y,x+7,y+7)
016B        NEXT y
0176      NEXT x
0181      x=160 \y=0
018F 1    ch=""
0199      WHILE ch="" DO
01A5        RUN inkey(ch)
01AF        RUN gfx2("curhome")
01BE        RUN gfx2("color",2)
01CE        RUN gfx2("bar",x,y,x+7,y+7)
01F1        RUN gfx2("color",0)
0201        RUN gfx2("bar",x,y,x+7,y+7)
```

```
0224          RUN gfx2("color",p((x-150)/10,(y+8)/8))
0248          RUN gfx2("bar",x,y,x+7,y+7)
026B        ENDWHILE
026F        IF ch="j" OR ch="J" THEN
0284          x=x-10
028F          IF x<160 THEN
029B            x=x+240
02A6          ENDIF
02A8        ELSE
02AC          IF ch="l" OR ch="L" THEN
02C1            x=x+10
02CC            IF x>390 THEN
02D9              x=x-240
02E4            ENDIF
02E6          ELSE
02EA            IF ch="," OR ch="<" THEN
02FF              y=y+8
030A              IF y>184 THEN
0316                y=y-192
0321              ENDIF
0323            ELSE
0327              IF ch="i" OR ch="I" THEN
033C                y=y-8
0347                IF y<0 THEN
0353                  y=y+192
035E                ENDIF
0360              ENDIF
0362            ENDIF
0364          ENDIF
0366        ENDIF
0368        IF ch="f" OR ch="F" THEN
037D          GOTO 3
0381        ENDIF
0383        IF ch="d" OR ch="D" THEN
0398          GOTO 2
039C        ELSE
03A0          GOTO 1
03A4        ENDIF
03A6 2      ch=""
03B0        WHILE ch="" DO
03BC          RUN inkey(ch)
03C6          RUN gfx2("curhome")
03D5        ENDWHILE
03D9        IF ch<"0" OR ch>"3" THEN
03EE          GOTO 2
03F2        ENDIF
03F4        c=VAL(ch)
03FE        RUN gfx2("color",c)
0410        p((x-150)/10,(y+8)/8)=c
042B        RUN gfx2("bar",x,y,x+7,y+7)
044E        c=0
0455        GOTO 1
0459 3      FOR q=1 TO 24
046C          FOR r=1 TO 6
047C            icar(r,q)=0
048A            FOR s=1 TO 4
049A              i=1
04A1              IF s=4 THEN
04AD                GOTO 4
04B1              ENDIF
04B3              FOR ic=1 TO 4-s
04C7                i=i*4
04D2              NEXT ic
04DD 4            icar(r,q)=icar(r,q)+p((r-1)*4+s,q)*i
050D            NEXT s
0518          NEXT r
0523        NEXT q
052E        path=1
0535        RUN gfx2("color",2)
0545        RUN gfx2("curon")
0552        INPUT "Pathlist for icon file",fname
0570        CREATE #path,fname:WRITE+DIR
057C        FOR q=1 TO 24
058C          FOR r=1 TO 6
059C            SEEK #path,(q-1)*6+r-1
05B3            PUT #path,icar(r,q)
05C4          NEXT r
05CF        NEXT q
```

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Need a Little Support?

by Marty Goodman
Contributing Editor

I have a DMP-120 printer and it does not seem to be supported by any graphics screen dumps in the software I have, including screen dumps that are supposed to work with a variety of other Tandy printers. Can you help?

David B. Smith
Grand Portage, Minnesota

The DMP-120 is incompatible with Tandy's own standard for graphics printers. The only sensible thing to do is buy a new printer. I recommend the Panasonic line. In the $180-to-$350 price range are three excellent models: the 1180, the 1190 and the 1124. They all offer outstanding value and their Epson compatibility makes them useable with most commercial software packages for the CoCo and MS-DOS machines. Also worth considering may be a new Epson printer in the under-$200 price range. Many CoCo owners report good experiences with the Star Micronix NX-1000 printer as well.

Shocking Experiences

Some time ago you recommended that those who handle ICs in a high-static environment ground themselves to a water pipe. You neglected to mention that such grounding should be done via a fairly high (10,000 to 100,000 ohms) resistance to avoid potential shock hazard.

Can the ancient Disk/Video Interface Tandy sold for the Model 100 be used with other computers?

D.G. Smith
Johnstown, Pennsylvania

Thanks for the correction. It should be mentioned that most commercial static kits use a one-megohm resistor.

It's not worth trying to change the Disk/Video Interface for use with other machines. Although it has an FD-501-type disk drive in it that can be used to add a second drive to an existing CoCo drive system. If you are adept at desoldering ICs, it might be worth desoldering the WD1793 chip on the motherboard of the unit. It would make a valuable spare for the second-release Tandy disk controller (Cat. No. 26-3029). The case and power supply might be suitable for another drive system.

What Drives With the CoCo?

What 3½-inch drives can be used with the CoCo? Can the 1.44-Meg, 3½-inch drives be used with a CoCo?

Arturo Noguera
Tlapan, Mexico

The 1.44-Meg, 3½-inch drives can be used with the CoCo but only if jumpered to force operation in the 720K-only mode. All ordinary CoCo floppy disk controllers can support only the 250K-bps (bits per second) data transfer rate of 360K and 720K 5¼-inch drives and 720K, 3½-inch drives — not the 500K-bps data transfer rate required by 1.2-Meg, 5¼-inch drives and 1.44-Meg, 3½-inch drives.

Note that when jumpered properly, a 1.44-Meg, 3½-inch drive will work perfectly as a 720K drive, but a 1.2-Meg, 5¼-inch drive cannot be properly used as either a 360K or 720K drive. Note, too, that in order to fully use 360K or 720K drives, you need a modified disk ROM (*ADOS, ADOS 3* or *RGBDOS*) under Disk BASIC, or you'll need OS-9.

Atari Hook-up

How can I hook up a 300-baud Atari modem (of the sort used with an Atari ST) to a CoCo 3?

Robert T. Wise
San Francisco

Don't bother trying! The serial port for the Atari is different from that of the CoCo and other standard RS-232 ports. It is not worth the time and effort to try to adapt a 300-baud modem when 1200-baud modems are available for $20 to $45 used or for $50 to $65 new.

Faulty Buffer?

I have a Blue Streak serial-to-parallel converter that works fine when hooked directly between my printer and CoCo's serial port, but when I put a parallel-to-parallel buffer between the converter and the printer port, the printer will not print. What's going on here?

Doug Fischer
Hempstead, Maryland

Sounds like your Blue Streak converter was set up to be powered from Pin 18 of the printer's 36-pin connector. Many (but not all) printers provide a small amount of current at 5 volts for this purpose. The buffer does not provide 5 volts on Pin 18, and so your converter is not getting power.

You have two ways to fix matters: Arrange to supply power externally to the Blue Streak converter (your instructions should tell you how to do this), or modify the parallel-to-parallel buffer so that it puts +5 volts on Pin 18 of the side that connects to the Blue Streak. If doing the latter (the more difficult but more elegant fix), find out if Pin 18 of the buffer is grounded first. If it is, you must disconnect it from ground before putting +5 volts on it. You can find

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer-passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

a source of regulated +5 volts at Pin 14 of most 14-pin, or on Pin 16 of most 16-pin, 74-series chips.

I advise you to put a current limiting resistor (a 100-ohm, ¼-watt resistor, for example) between the source of +5 volts and Pin 18 to prevent damage if the buffer is plugged into a device that grounds Pin 18. The Blue Streak converter is designed with low-power CMOS chips and draws only a few milliamps. This is true of most other serial-to-parallel converters, too.

Is It True?

Is it true that the largest program you can write under OS-9 is 64K in size?

Tom A. Bauer
Hermosa Beach, California

No, there are a number of techniques for getting around the 64K barrier under OS-9. A feature article may soon appear in THE RAINBOW that explains some of the techniques. To get around the 64K barrier for programs and data structures, one approach is to swap in and out segments of data and program code.

RGB CGA Monitors

I am looking for a good buy on a Color Computer 3 monitor. I've seen ads for inexpensive RGB CGA monitors. Can I use them with the CoCo 3's 80-column text and graphics displays?

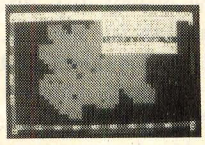
George Eastland, Jr.
Saginaw, Michigan

CGA RGB describes a monitor that accepts a video signal protocol rather different from (though in some ways similar to) the RGB protocol the Color Computer 3 uses. Monitors with only CGA type inputs are designed to receive the video via four digital luminance lines (R,G,B and I) and two sync lines (H and V sync). The CGA sync protocol is exactly the same as that put out by the CoCo 3's RGB port. But the luminance lines are quite different. The CoCo puts out a signal at levels varying continuously between 0 and .9 volts on its R,G and B lines. The CGA monitor is expecting a signal at a level under .4 or over 3.5 volts on its luminance lines.

With some CGA monitors, you can hook up R to R, B to B, G to G, and H and V sync to H and V sync (ignoring the I line) and actually get a creditable picture and even view 80-column text just fine with the CoCo 3. But with this setup, even if it works, you get only six colors plus black and white, not the full 64-color set the CoCo 3 offers. This is adequate for text but worthless for most graphics applications.

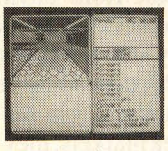
What you need is a monitor that has Analog RGB inputs. The Magnavox 8CM515 remains the best price-performer among new monitors. It is sold by several RAINBOW advertisers, including Microcom and Howard Medical. An experienced hacker, especially if in possession of a schematic diagram, can often convert a CGA monitor into one that accepts analog

Overlord New!

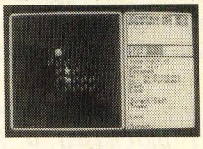


Peace through superior firepower is the catch phrase in this sophisticated wargame simulator. Victory shall not fall to he who is the mightiest, oh no, but to he who can plan ahead and develop the better strategy. You must ensure that all your troops are brought into battle at the right moment, and for that you must set your most industrialized cities to producing troop transporters. Other cities will build Aircraft carriers, fighter jets, paratroop regiments, submarines, spy planes, battleships, destroyers, and cruisers. Up to three people can play the game simultaneously, each starting out at his own base city, each knowing nothing about the strenghts and locations of his enemies' forces. The player's own combat troops will head out, exploring the world as they go, capturing towns that lie waiting, or engaiging the enemy face to face. You can set any or all of the three players to be operated by the sinister silicon brain of your CoCo 3, and battle against them or let them battle each other.

Price: $29 US / $34 Cdn.
Overlord requires: 128k CoCo 3, 1 drive and a mouse or joystick.

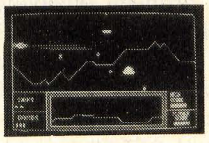


the Seventh Link



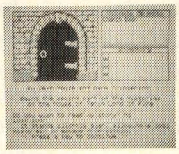
We've said it before and we'll say it again: This is the best fantasy role-playing adventure the CoCo has ever seen, bar none. A full 3 discs are filled with worlds, towns castles, and dungeons. The dungeons are spectacular 3D creations, filled with full colour, hi-res monsters, ladders, doors and pits, chests, pools, lava and flooded rooms. You would not believe that a CoCo 3 could produce such high-speed detailed graphics. The dungeons are only part of the story, however. In the wild lands above, you'll find monsters, towns and castles. The towns will reveal merchants, learned locals, even a friend or two who will join your quest. Maybe you will find band of pirates as you tread the windswept shores. Could you and your companions defeat them? Test your mettle during the hundreds of hours of play time The Seventh Link will bring you.
$38 US/ $48 Cdn. Req: CoCo3, 40 track drive (RS drive is OK if it's white)

Defendroid



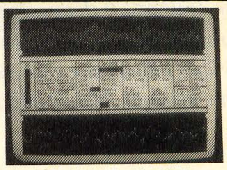
A classic returns! Arcade realism for the Coco 3 is brought one step closer with this outstanding action game. Sinister aliens are appearing in the skies over Zabburtuth, and you and your Turbo-Flier are all that stand in their way! Use lasers and smart-bombs, fuel depots and your astronaut-tractor to save the hapless inhabitants from certain stir-frying as hideous alien cuisine! This program contains a graphics manipulation routine so advanced, we registered a copyright for it alone. See what a threefold increase in software speed and memory efficiency can do for your CoCo 3!
Price $29 US / $34 Cdn New!
Defendroid requires: 128k CoCo 3, 1 drive, 1 joystick.

Caladuril II: Weatherstone's End



"Some of the best graphics to be seen on a CoCo 3" will lead you through a land of mystery, as you attempt to discover the fate of the Weatherstone. Smooth scrolling 16 colour graphics and a sophisticated command interpreter lend realism and enjoyment to one of the most extensive adventures to be found on a CoCo. Package includes 2 discs, an 11x17" map, a velvet pouch of powerstones and a 20 page booklet.
Price: $32 US/ $38 Cdn
Requires: 128k CoCo 3, 1 drive

Studio Works



The most extensive, powerful and easy-to-use digital sampling system available! An audio signal is captured (digitized)with the supplied cable,(or make your own, or use a MaxSound cable), and recorded in CoCo's memory. You may then manipulate the sounds with the audio clipboards, reverse, combine. etc. You may also include the sounds in your own BASIC programs.
$54 US/$64 Cdn with cable $39/$49 wo
Requires: 128k Coco3,drive, mouse/joystick

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FX2: Animals (3 discs, 11 smpls) $14 rec'd

Hint Books!
Finally, help is here! Calduril 1 and 2 books are 15 pages and $3.50 each. The Seventh Link books are 40 pages (lots of maps) and $5.50.

New! **Those Darn Marbles**

Dedicate a program to 512k machines only, and all sorts of new things are possible. Those darn Marbles is the first CoCo game to use the built-in hardware screen scrolling features of the CoCo 3. This means that all the computer's time cn be dedicated to controlling the game itself (sound effects, moving objects around, etcetera) rather than the time-intensive chore of scrolling an entire 32k screen around. You will be amazed to see how smoothly a HARDWARE-scrolled screen can move. Compare Those Darn Marbles with any other 3D marble type game on any computer, and you will be convinced that your CoCo 3 really can stand with the best of them. (One of our playtesters remarked, upon seeing the pre-release version of TDM: "My Amiga isn't that smooth!")
Not convinced? TDM is so chock-full of graphics that it comes on (count 'em) six discs! It's been said many times, but this time it's true: Your CoCo 3 game library is not complete without a copy of Those Darn Marbles.
Price $32 US / $38 Cdn. Requires: 512k CoCo 3,1 drive,joystick.

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signals. This typically involves removing a chip or at least tapping in to the luminance circuitry beyond the digital input section of the circuit. I've done this on two or three CGA monitors with great success. It takes a couple of hours to do a good job, and you really have to know what you are doing.

Price Hike

In the 1990 Radio Shack catalog, the price for a 512K upgrade for the CoCo 3 is $340 ($40 for the board plus $150 each for two sets of 256K DRAMs). This is $150 higher than in the previous catalog. What's going on here?

Bryan Clingman
Lubbock, Texas

The price on 256K DRAMs fluctuated greatly last year — from a low of $1.50 per chip to a high of $15 per chip. Tandy was burned, I suspect, by being forced to deliver those chips at prices below wholesale. When the 1990 catalog prices were prepared, the price for 256K DRAMs was still high, and Tandy no doubt wanted to cover itself. While the price of such chips still fluctuates, as I write this, 120 nanosecond, 256K DRAMs are available at computer shows for $3.50 to $4 per chip. The price seems to be drifting downward. Also check out the 512K upgrades available from third-party vendors in THE RAINBOW, such as Microcom or Howard Medical.

No Artifact Colors

I purchased a Magnavox 8CM515 monitor to use with my CoCo 1 F-board computer. I bought a VA-1 video amplifier from Howard Medical in order to produce a color composite video signal for it. However, while I get normal colors in text and PMODE*s 0 through 3, in* PMODE 4 *I get no artifact colors, only black and white stripes. When I hook the RF output to a television, the artifact colors are fine. Can you help?*

Thomas Chilcott
Philadelphia

It sounds as if you are the victim of a combination of circumstances: The CoCo 1 F-board computer has by far the touchiest of all the video circuitry when it comes to PMODE4 artifact colors. The resistor, capacitor and inductor soldered in (after the fact) by Tandy represents an attempt to fix the problems it has rendering artifact colors. Worse, while in most respects the Magnavox 8CM515 is an exceptionally fine monitor, its composite video input is just a tad touchy, too, when it comes to its ability to render artifact colors. Finally, rendering artifact colors is something that often presents problems for video amplifiers like the VA-1. Apparently, due to marginal performance in the area of artifact colors by all three of these things, you are unable to get artifact colors to appear on your monitor. When you use the RF output, you are dealing only with the CoCo's video, not with the problems caused by the video amp or the Magnavox monitor's input.

One possible solution to problems posed by running Extended ADOS 3 with Ultimaterm isto strap the interrupt lines.

There is no simple fix for this problem, apart from buying another Color Computer. CoCo 1s and 2s are often available in my area at flea markets for between $5 and $20, depending on the condition. Unfortunately, if you do not have access to such flea markets, they might be hard to get. The D or E board CoCo 1 is by far the best in terms of stable artifact colors. But almost any other CoCo 1 or 2 provides more stable artifact video than the CoCo 1 F-board.

Ultimaterm Under *ADOS 3*

I'm working on a problem involving using Ultimaterm *with* Extended ADOS 3 *and would like some clarification. I was under the impression the RS-232 Pak, with an ACIA chip addressed via complete decoding to $FF68 through $FF6B (outside of the $FF40 through $FF5F range controlled by the *SCS line), should operate totally independent of the slot in which it is placed in the Multi-Pak Interface. Yet some software (*Ultimaterm, *for example) seems to need to point the Multi-Pak at the slot with the RS-232 Pak. Why is this?*

Art Flexser
Miami

You've uncovered a rather subtle aspect of the RS-232 Pak: Some Disk BASIC software (and all OS-9 software) uses the IRQ line generated by the RS-232 Pak. You are correct in assuming the actual port addresses for the ACIA chip in the RS-232 Pak are totally "slot independent." However, software such as *Ultimaterm* uses the interrupt generated by the RS-232 Pak and forces it to be slot-dependent because the *CART interrupt is selected (along with the *CTS ROM decode line) via the Multi-Pak software and hardware to come from only one Multi-Pak slot at a time.

If you are not using auto-start ROM packs with your Multi-Pak, one possible solution to problems posed by running *Extended ADOS 3* with *Ultimaterm* is to strap the interrupt lines of the Multi-Pak as described by Tony DiStefano in "Turn of the Screw" (September 1988 RAINBOW, Page 140). Once the Multi-Pak's interrupt pins have been strapped, the RS-232 Pak is totally slot-independent, regardless of whether or not the software that addresses it uses the interrupt capability. For more information see my article, "The OS-9 *CART Interrupt Fix," in the November 1989 issue of THE RAINBOW (Page 50).

A Drive Test

Can you recommend a good disk drive testing program for the Color Computer?

Perry Davis
Swansboro, North Carolina

There is only one decent disk drive-testing program available for the CoCo, and that one runs on all models of the CoCo. It is excellent except for a mediocre and sometimes confusing user interface. This is the *Memory Minder* program offered by J&M Systems. Its address and phone number is: J&M Systems, 15100A Central SE, Albuquerque, NM 87123; (505) 292-4182. The price is about $79, including a professional digital alignment disk.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we recieve, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then , at the RAINBOW> prompt , type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt , where you can select the "CoCo Consultations" on line form which has complete instructions.

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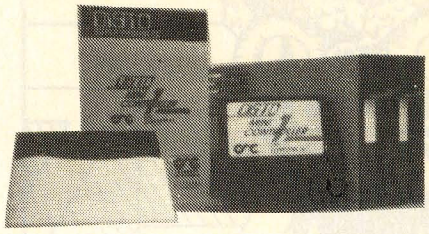

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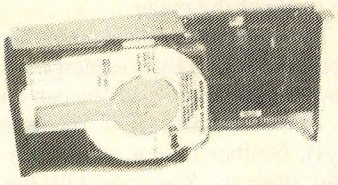

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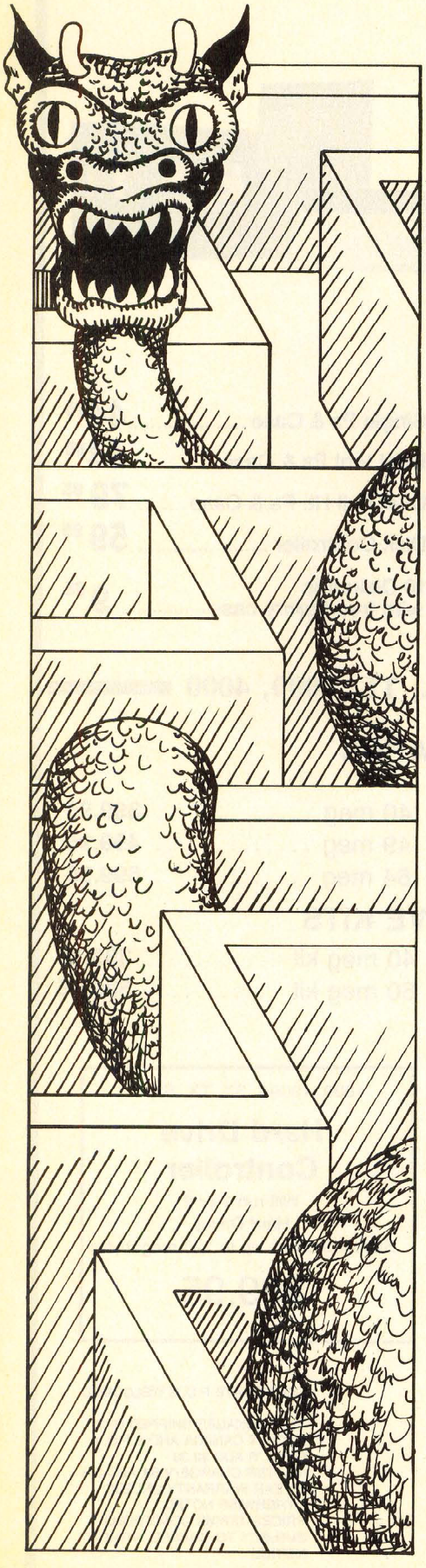

In search of the wondrous energy star

A Mazing Adventure

by Joel Hegberg

Are you ready for your CoCo to take you into an enchanted world filled with castles and dragons? If you are, this program's for you. *The Quest* is an adventure that takes you through many perils in your quest for the evil dragon!

There are 13 rooms filled with various obstacles in this adventure. There are three differently colored castles. The blue castle is yours and the white one belongs to the evil dragon. (You must discover the purple castle for yourself.) To enter these castles you must first unlock the gates with specific keys.

The evil dragon has stolen the energy star that empowers your kingdom and has hidden it somewhere in the enchanted land. Your uneasy task is to find the energy star and bring it back to your kingdom. The evil dragon has created two mazes to slow you down. The first maze is fairly simple since you can see where you are going. The second maze is almost impossible to get through — it is invisible and you can't see the walls of the maze.

The dragon can appear anywhere, in any room. It has a slight advantage since it can move diagonally while you can only move up, down, left and right (using the arrow keys). Neither of you can move through solid objects. You can kill the dragon (temporarily) if you touch it while holding the sword.

You can move by using the arrow keys and stop by pressing any other key that doesn't affect the game (the ENTER key, for example). To pick up an object, simply touch it. The object you're currently holding appears at the bottom left of your screen. To drop the object, press the space bar. If you want to return to your castle, you can press R. Any object you are holding at the time you press R is dropped in the room you were in. The same happens if you are eaten by the evil dragon.

To win the game, you must drop the energy star inside the blue castle. Your score is based on the amount of time it takes you to complete the adventure. You can quit a game at any time by pressing Q.

This game is sure to keep you busy for a while, especially the invisible maze. As many adventurers already know, never rule

---

Joel Hegberg has been programming for about seven years. He likes using the Commodore and Color Computers. He is a senior in high school and hopes to make a career of his programming skills. He can be contacted at 936 N. 12th St., DeKalb, IL 60115.

out the possibility of a hidden room to make life in an enchanted world a little easier (hint, hint!).

The Quest runs on all CoCos with at least 32K of memory. If you are using anything other than a CoCo 3 and want your copy of the program to be compatible with the CoCo 3, make sure you save the program in ASCII format by entering (C) SAVE"THEQUEST",A. If you are using a CoCo 3, you are asked if you are using a composite or RGB monitor when you run the program. (A television set is considered to be a composite monitor as far as colors are concerned.) This question is not asked if the program is run on the CoCo 1 or 2.

Finally you are asked whether you want to use the high-speed poke. This makes the program run at twice the normal speed — without it, the game is not very responsive. I must caution all CoCo 1 and 2 users that the high-speed poke may cause components to overheat, which can damage the computer. However, I also have a CoCo 2 and always run it in high-speed mode with no problems whatsoever. ❑

32K ECB

```
170 ..... 49
300 ..... 227
440 ..... 236
600 ..... 68
700 ..... 119
840 ..... 145
950 ..... 150
1080 ..... 18
1240 ..... 89
1370 ..... 239
1470 ..... 48
1560 ..... 10
END ..... 202
```

The listing: THEQUEST

```
0 ' COPYRIGHT 1989 FALSOFT, INC
10 '
20 'THE QUEST
30 'BY JOEL MATHEW HEGBERG
40 '936 NORTH TWELFTH STREET
50 'DE KALB, ILLINOIS  60115
60 '
70 '
80 CLEAR1000:DIM MZ$(1,12):GOTO1
610
90 CLS:PRINT"PLEASE WAIT...":RES
TORE:B$=CHR$(191):FORM=0TO1:IFM=
1THENB$=CHR$(143)
100 FORY=0TO12:READA$:FORX=1TO29
:IFM1D$(A$,X,1)="1"THENMID$(A$,X
,1)=B$:ELSEMID$(A$,X,1)=" "
110 NEXTX:MZ$(M,Y)=A$:NEXTY,M
120 CLS:PRINT"the quest":PRINT"(
C) DECEMBER 23, 1988 BY":PRINT"J
OEL MATHEW HEGBERG.":PRINT@480,"
PRESS ANY KEY.";:DEFFNLC(Z)=PEEK
(1024+Y*32+X):A$=INKEY$
130 IFINKEY$=""THEN130:ELSER=RND
(-TIMER):TIMER=0:CK=0
140 CLS:GOSUB1130
150 B$="":RM=PR:GOSUB880:POKE102
4+Y*32+X,175:GOSUB1220:FORT=338T
0345:POKET,255:NEXTT:CK=CK+TIMER
```


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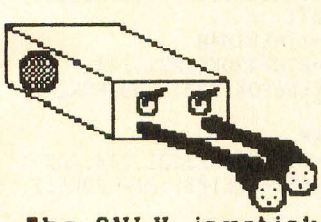

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"...will blow your socks off...impossible to give Extended ADOS-3 anything other than a rave review."
— Rainbow, October 1989.

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— CoCo Clipboard, Sept/Oct 1989.

ADOS-3 (reviewed July 1987)
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ADOS for Coco 1 and 2 (reviewed June 1987) Disk, **$27.95.**

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```
:TIMER=0
160 '
170 A$=INKEY$:IFA$=""THENA$=B$:E
LSEB$=A$
180 X1=X:Y1=Y:IFA$=CHR$(94)THENY
=Y-1:ELSEIFA$=CHR$(10)THENY=Y+1:
ELSEIFA$=CHR$(8)THENX=X-1:ELSEIF
A$=CHR$(9)THENX=X+1:ELSEIFA$=" "
THEN680:ELSE200
190 P=FNLC(Z):IFP<>96THEN390:ELS
EPOKE1024+Y1*32+X1,96:POKE1024+Y
*32+X,175
200 IFX<1OR X>30OR Y<1OR Y>13THE
N600
210 IFMR(0)=PR THEN320:ELSEGOSUB
240
220 IFA$="R"THEN570:ELSEIFA$="Q"
THEN120
230 GOTO160
240 IFMR(0)= 1THEN280:ELSEIFRND(
999)>980THEN MR(0)=RND(13):GOSUB
260:IFMR(0)=PR THENXX=MX(0):YY=M
Y(0):GOSUB1310:MX(0)=XX:MY(0)=YY
:POKE1024+MY(0)*32+MX(0),102:CK=
CK+TIMER:TIMER=0
250 RETURN
260 IFMR(0)=8THENMR(0)=RND(13):G
OTO260
270 RETURN
280 MT=MT-1:IFMT>0THENRETURN
290 MR(0)=13
300 IFMR(0)=PR THENMR(0)=RND(13)
:GOTO300
310 RETURN
320 POKE1024+Y*32+X,96:POKE1024+
MY(0)*32+MX(0),96:M1=MX(0):M2=MY
(0)
330 IFX<M1 THENM1=M1 1:ELSEIFX>M
1 THENM1=M1+1
340 IFPEEK(1024+M2*32+M1)<>96THE
N M1=MX(0)
350 IFY<M2 THENM2=M2-1:ELSEIFY>M
2 THENM2=M2+1
360 IFPEEK(1024+M2*32+M1)<>96THE
N M2=MY(0)
370 POKE1024+Y*32+X,175:MX(0)=M1
:MY(0)=M2:POKE1024+M2*32+M1,102
380 IFMX(0)=X ANDMY(0)=Y THEN530
:ELSE220
390 IFP=102THEN530:ELSEIFP=144TH
EN490:ELSEIFP=233ORP=217ORP=201A
ND HL>0AND HL<4THEN450
400 IFP=106ORP=95ORP=214ORP=230O
RP=198THEN420
410 X=X1:Y=Y1:GOTO200
420 IFHL<>0THEN410
430 IFP=214THENHL=1:KR(0)=-1:ELS
EIFP=230THENHL=2:KR(1)=-1:ELSEIF
P=198THENHL=3:KR(2)=-1:ELSEIFP=1
06AND TR=PR THENHL=4:TR=-1:ELSEI
FP=95THENHL=5:SW=-1:ELSE410
440 SOUND150,1:POKE1024+Y1*32+X1
,96:POKE1024+Y*32+X,175:POKE1504
,P:GOTO200
450 IFHL=1ANDP=217THENCC=0:GOTO4
80:ELSEIFHL=2ANDP=233THENPC=0:GO
TO480:ELSEIFHL=3ANDP=201THENWC=0
:GOTO460:ELSE410
460 POKE1295,144:POKE1296,144
470 GOTO410
480 POKE1231,144:POKE1232,144:GO
TO470
490 IFPR=2OR PR=6THENPR=PR 1:Y=1
3:GOTO150
500 IFPR=13THENPR=12:X=30:GOTO15
0
510 IFPR=10THENPR=11:GOTO150
520 GOTO410
530 IFHL=5THENPOKE1024+32*MY(0)+
MX(0),96:MR(0)=-1:MT=100:GOTO220
540 PLAY"V31T8L602CADEGC"
550 PRINT@480,"PRESS ANY KEY TO
CONTINUE PLAY.";
560 IFINKEY$<>""THENFORT=0TO100:
NEXTT:GOTO560:ELSE590
570 CLS:MR(0)=13:IFHL<4AND HL>0T
HENKR(HL-1)=PR:ELSEIFHL=4THENTR=
PR:ELSEIFHL=5THENSW=PR
580 X=15:Y=11:PR=2:HL=0:GOTO150
590 IFINKEY$=""THEN590:ELSE570
600 IFX<1THENMV=1:X=30:ELSEIFX>3
0THENMV=2:X=1:ELSEIFY<1THENMV=3:
Y=13:ELSEIFY>13THENMV=4:Y=1:ELSE
210
610 IFPR=1THENPR=2:Y=7:GOTO150:E
LSEIFPR=5THENPR=6:Y=10:GOTO150:E
LSEIFPR=11THENPR=10:Y=4:GOTO150
620 IFPR=2OR PR=6THENPR=PR+1:GOT
O150:ELSEIFPR=3ANDMV=2THENPR=4:G
OTO150:ELSEIFPR=3THENPR=2:GOTO15
0
630 IFPR=4ANDMV=1THENPR=3:GOTO15
0:ELSEIFPR=4THENPR=7:GOTO150:ELS
EIFPR=7ANDMV=1THENPR=4:GOTO150:E
LSEIFPR=7ANDMV=2THENPR=8:GOTO150
:ELSEIFPR=/THENPR=6:GOTO150
640 IFPR=8ANDMV=1THENPR=7:GOTO15
0:ELSEIFPR=8THENPR=9:GOTO150:ELS
EIFPR=13THENPR=9:GOTO150
650 IFPR=9ANDMV=1THENPR=8:GOTO15
0:ELSEIFPR=9ANDMV=2THENPR=13:GOT
O150:ELSEIFPR=9THENPR=10:GOTO150
660 IFPR=10ANDMV=3THENPR=9:GOTO1
50:ELSEIFPR=10THENPR=11:GOTO150:
ELSEIFPR=12ANDMV=1THENPR=7:GOTO1
50:ELSEIFPR=12THENPR=13:GOTO150
670 PRINT"MOVEMENT ERROR FROM RO
OM #"PR:PRINT"MOTION #"MV:STOP
680 IFHL=0THEN200:ELSEPOKE1504,9
6:XX=X+1:YY=Y+1:GOSUB1310
690 IFHL<4THENHL=HL-1:KR(HL)=PR:
KY(HL)=YY:KX(HL)=XX:ELSE720
700 IFHL=0THENP=214:ELSEIFHL=1IH
ENP=230:ELSEP=198
710 POKE1024+32*KY(HL)+KX(HL),P:
HL=0:SOUND1,1:GOTO200
720 IFHL=4THENTR=PR:TX=XX:TY=YY:
POKE1024+TY*32+TX,106:SOUND1,1:H
L=0:IFTR=1THEN740:ELSE200
730 SW=PR:SX=XX:SY=YY:POKE1024+S
Y*32+SX,95:SOUND1,1:HL=0:GOTO200
740 PLAY"V31T4L402CEGO3T2CO2T4AO
3T1C"
750 PRINT@480,"YOU DID IT!!!";:C
=CK+TIMER
760 IFINKEY$<>""THEN760
770 IFINKEY$=""THEN770
780 CLS:RM=10:WC=0:GOSUB880
790 FORY=0TO7:POKE1039+Y*32,102:
FORT=0TO200:NEXTT:POKE1039+Y*32,
96:NEXTY
800 FORR=10TO0STEP 1:FORT=5TO13:
PRINT@T*32+4,STRING$(24,207);:NE
XTT:FORT=0TO10*R:NEXTT:FORT=5TO1
3:PRINT@T*32+4,STRING$(24,128);:
NEXTT:FORT=0TO10*R:NEXTT,R
810 FORT=5TO13:PRINT@T*32+4,STRI
NG$(24,32);:NEXTT
820 PRINT@480,"GOOD HAS CONQUERE
D EVIL AGAIN!";
830 IFINKEY$=""THEN830
840 CLS:PRINT"YOU FINISHED THE A
DVENTURE IN":PRINTINT(CK/60);"SE
CONDS."
850 PRINT@480,"PRESS ANY KEY.";
860 IFINKEY$=""THEN860:ELSE120
870 GOTO870
880 IFRM=3OR RM=7OR RM=8OR RM=9O
R RM=13THENPK=128:ELSEIFRM=1OR R
M=2THENPK=223:ELSEIFRM=5OR RM=6T
HENPK=239:ELSEIFRM=4THENPK=191:E
LSEIFRM=10OR RM=11THENPK=207:ELS
EPK=175
890 CLS:PRINTSTRING$(32,PK):PRIN
T@448,STRING$(32,PK);:FORT=1TO13
:POKE1024+32*T,PK:POKE1024+32*T+
31,PK:NEXTT
900 IFRM=4OR RM=8THENFORT=1TO12:
POKE1024+32*T+30,PK:NEXTT:POKE10
56,96:POKE1471,96:GOTO970
910 IFRM=1OR RM=5THENPOKE1487,96
:POKE1488,96:RETURN
920 IFRM=2OR RM=6THENPOKE1487,96
:POKE1488,96:GOTO990:ELSEIFRM=3T
HENPOKE1039,96:POKE1040,96:POKE1
087,96:RETURN
930 IFRM=7THENPOKE1440,96:POKE10
87,96:POKE1039,96:POKE1040,96:GO
TO1060
940 IFRM=9THENPOKE1440,96:POKE12
79,96:POKE1487,96:POKE1488,96:GO
TO1070:ELSEIFRM=13THENPOKE1248,9
6:POKE1056,144:GOTO1080
950 IFRM=10THENPOKE1039,96:POKE1
040,96:GOTO1090
960 IFRM=11THENPOKE1039,96:POKE1
040,96:RETURN:ELSEIFRM=12THENPOK
E1056,96:POKE1087,96:POKE1262,10
:POKE1263,13:POKE1264,8:RETURN
970 MZ=0:IFRM=8THENMZ=1
980 FORT=0TO12:PRINT@(T+1)*32+1,
MZ$(MZ,T);:NEXTT:RETURN
990 FORT=1TO6:PRINT@T*32+4,STRIN
G$(24,PK);:NEXTT
1000 FORT=7TO9:PRINT@T*32+4,STRI
NG$(8,PK);STRING$(8,32);STRING$(
8,PK);:NEXTT
1010 IFRM=2THEN1040
1020 IFPC=0THENPOKE1231,144:POKE
1232,144:ELSEPOKE1231,233:POKE12
32,233
1030 RETURN
1040 IFCC=0THENPOKE1231,144:POKE
1232,144:ELSEPOKE1231,217:POKE12
32,217
1050 RETURN
1060 FORT=10TO22:FORTT=5TO9:POKE
1024+TT*32+T,159:NEXT TT,T:RETUR
N
1070 FORT=4TO26:POKE1152+T,175:P
OKE1344+T,175:NEXTT:FORT=6TO8:PO
KE1039+T*32,175:NEXTT:RETURN
1080 FORT=5TO0STEP-1:POKE1167+T*
32-T,207:POKE1167+T*32+T,207:NEX
TT:RETURN
1090 FORT=13TO8STEP-1:PRINT@T*32
+4,STRING$(24,PK);:NEXTT
1100 FORT=7TO5STEP-1:PRINT@T*32+
4,STRING$(8,PK);STRING$(8,32);ST
RING$(8,PK);:NEXTT
1110 IFWC=0THENPOKE1295,144:POKE
1296,144:ELSEPOKE1295,201:POKE12
96,201
1120 RETURN
1130 HL=0:PR=2:X=15:Y=11:MR(0)=1
3:MX(0)=2:MY(0)=8:PC=1:CC=1:WC=1
1140 FORK=0TO2
1150 KP=RND(13):IFKP=12OR KP=150
```

```
R KP=10R KP=11THEN1150:ELSEKR(K)
=KP:RM=KR(K)
1160 KX(K)=RND(27)+2:KY(K)=RND(1
1)+2:NEXTK
1170 SW=RND(13):IFSW=12THEN1170
1180 SX=RND(27)+2:SY=RND(11)+2
1190 TR=RND(13):IFTR=5OR TR>8AND
 TR<>12THEN1200:ELSE1190
1200 TX=RND(27)+2:TY=RND(11)+2
1210 RETURN
1220 IFMR(0)<>RM THEN1230:ELSEXX
=MX(0):YY=MY(0):GOSUB1310:MX(0)=
XX:MY(0)=YY:POKE1024+MY(0)*32+MX
(0),102
1230 FORK=0TO2:IFKR(K)=RM THENXX
=KX(K):YY=KY(K):GOSUB1310:KX(K)=
XX:KY(K)=YY:GOTO1250
1240 NEXTK:GOTO1270
1250 IFK=0THENPK=214:ELSEIFK=1TH
ENPK=230:ELSEPK=198
1260 POKE1024+32*KY(K)+KX(K),PK:
GOTO1240
1270 IFSW=RM THENXX=SX:YY=SY:GOS
UB1310:SX=XX:SY=YY:POKE1024+SY*3
2+SX,95
1280 IFTR=RM THENXX=TX:YY=TY:GOS
UB1310:TX=XX:TY=YY:POKE1024+TY*3
2+TX,106
1290 IFHL=1THENPOKE1504,214:ELSE
IFHL=2THENPOKE1504,230:ELSEIFHL=
3THENPOKE1504,198:ELSEIFHL=4THEN
POKE1504,106:ELSEIFHL=5THENPOKE1
504,95
1300 RETURN
1310 IFPEEK(1024+YY*32+XX)=96THE
NRETURN
1320 YY=YY+1:IFYY>12THEN YY=2:XX
=XX+1:IFXX>29THEN XX=2
1330 GOTO1310
1340 GOTO1340
1350 DATA 00000100000000000010000
0000000
1360 DATA 1111010111111111010111
1111110
1370                          DATA
00000101000100000010100000000
1380 DATA 0101110101010111110101
1111110
1390 DATA 0101000101010001000101
0000000
1400 DATA 0111011101111101110111
0111110
1410 DATA 0000000100000100010100
0100010
1420 DATA 1101111111110101011101
1101010
1430 DATA 0000000000001010100000
0101010
1440 DATA 0111111111010101111111
0101010
1450 DATA 0001000001000101000100
0101010
1460 DATA 1101011111111101010101
1101011
1470 DATA 0001000000000000010000
0001000
1480 DATA 0001000101000100000100
0001000
1490 DATA 0101010101010101110111
1101110
1500 DATA 0100010100010100010000
0101000
1510 DATA 0111110101111111010111
0101011
1520 DATA 0001000100000000010100
0101000
1530 DATA 1101011111110111110111
1101010
1540 DATA 0001010001000101000100
0001010
1550 DATA 0111011101011101011101
0111110
1560 DATA 0001010001000001010001
0100000
1570 DATA 1101010101110111010111
0111011
1580 DATA 0001010100010001010001
0000000
1590 DATA 0111110101111101010101
1111110
1600 DATA 0000000100000001000100
0000010
1610 IFPEEK(33021)<>50THEN1640
1620 WIDTH32:CLS:PRINT"ARE YOU U
SING A (C)OMPOSITE OR  (R)GB MON
ITOR?"
1630 A$=INKEY$:IFA$="C"THENCMP:E
LSEIFA$="R"THENRGB:ELSE1630
1640 CLS:PRINT"HIGH SPEED MODE?
(Y/N)"
1650 A$=INKEY$:IFA$="Y"THEN1660:
ELSEIFA$="N"THEN1670:ELSE1650
1660 IFPEEK(33021)<>50THENPOKE65
495,0:GOTO90:ELSEPOKE65497,0:GOT
090
1670 IFPEEK(33021)<>50THENPOKE65
494,0:GOTO90:ELSEPOKE65496,0:GOT
090
```


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Program Shape-Up

by Joseph Kolar
Contributing Editor

You have flexed both your programming and artistic muscles without digging into your pockets except for a modest sum to buy graph paper and a few colored pens — not a bad investment. Neither have you dished out a healthy sum for special graphics programs guaranteed to turn you into a Picasso. Yet your graphics are unusual, though simple.

Once again this article presents a project to tighten up the program used to create the graphics character set. GET/PUT is our instrument to achieve this end.

By now you should have a comfortable acquaintance with this graphics technique. In this project you will draw the entire set of elements required to display the 16 characters, or blocks, in an 8-by-12 matrix. Graph paper is as indispensable as scratch sheets.

You have discovered, with assistance from PRESET, that you can eliminate drawing some blocks that are reverse images of PSET blocks. You will shrink the program in the DRAW statement section. If you locate the elements in a tight group, you can draw them using only one continuous DRAW statement. Graph paper allows the luxury of laying out the character blocks so you can see and adjust the designs on paper before using the CoCo.

The four graphics blocks readily reversed are those in which a small 4-by-6 block is reversed into an L-shaped block: CHR$(139), CHR$(142), CHR$(141) and CHR$(135).

On a sheet of graph paper rotated 90 degrees so that it is wider than long, at the first intersecting lines in the upper left-hand corner, place a dot in pencil. Label this point (0,0). Starting at (0,0), outline in pencil two adjacent 8-by-12 blocks with two more directly below. Make a boundary around each one; this should also give you the outer, larger boundary. Make the outside boundary darker.

Beginning at (0,0) along the top line, write 8 where the second box begins, and at the end of it write 16. This horizontal line along the top row provides the *x* coordinate.

From (0,0), heading down along the left side, make a tick mark every six lines. These provide the *y* coordinates. Rule a red guide line along the row at (0,12).

Next, make four 4-by-6 boxes in the four corners, beginning in the upper-left quadrant, going in a clockwise direction. You will make CHR$(135), CHR$(139), CHR$(142) and CHR$(141).

Plot this line on the graph paper:

```
DRAW"BM0,0ND6R4D6NL4BR8NR4U6R4D6
BD12NL4D6L4U6BL8L4U6R4D6"
```

Can you distinguish the four oblongs? Carefully outline them in black ink.

To add PAINT coordinates from the point of origin of each character, place a dot at the first diagonal in F direction, (down and to the right). Mark the coordinates garnered from the reference marks: (1,1), (13,1), (13,19) and (1,19). You don't have to waste time searching for them.

Look at Listing 1. Type in lines 10, 20, 140 through 170, 198 and 1000. Type in lines 240 through 270 and end them with PSET. At Line 30 type in the DRAW statement you used above to rough out the blocks on the worksheet. In Line 31 copy only the first four PAINT statements — or you will destroy your work. Then run the program.

Change lines 240 through 270 to PRESET and run the program.

On graph paper rule a red line vertically from (17,0). Note the space between panels created thus far. You must be careful when you PSET and PRESET so that colored portions of two different characters don't butt up against each color. The four (actually eight) characters created are islands in a background sea — thus, no problem.

On your worksheet trace in Line 30 from Listing 1 to reflect the shapes on the screen and outline them in black. For practice pick up and locate the PAINT coordinates. If you did the work diligently, you can see that none of the shapes butt directly against any other. CHR$(134) and its reverse mate, CHR$(137), are to be drawn separately. Did you notice a space left open at (17,12), making the super-graphic stored block one unit lower on the graph paper?

All the blocks are bunched together in the smallest possible area with an eye toward making a relatively simple, long program line.

Retype Line 30 from Listing 1. To Line 31 add the rest of the multiple PAINT statements. Type in lines 100 through 130 and 200 through 230 and run the program.

Each PUT line has two blank spaces at the right side to allow you to see each shape clearly. The PSET variables can be looked up in the PUT lines to identify each element in the display.

In lines 200 through 270 change all the PSETs to PRESETs, then run the program. Except for the first two, the other characters are accurate representations of mating graphics characters. We don't discard the PRESET versions of B and B1 variables. They are useful auxiliary graphics units. If you counted carefully, you noted that we failed to create two characters, the full-colored and the empty block.

Change lines 200 through 270 to end in NOT instead of PRESET. There are eight ways to make CHR$(128) in this particular program. However, be warned: NOT, OR and AND are tricky to use. Change lines 210,

---

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

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EDT/ASM III

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EDT/ASM III has the most powerful, easy to use Text Editor available in any Editor/Assembler package for the Color Computer.

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The Assembler features include:

- Supports Conditional IF/THEN/ELSE assembly.
- Supports Disk Library file up to 9 levels deep.
- Supports standard Motorola directives.
- Allows multiple values in FCB & FDB directives
- Allows assembly from the Buffer, Disk or both.

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230, 250 and 270 to end in AND instead of NOT. Then run the program. You have nine ways to blank out a character; the ninth being do not use a PUT line to make a CHR$(143) — just skip over the area. However, sometimes a CHR$(143) blank is an integral part of a program and must be used to get proper results.

There is yet another way. The following is just for information and is not part of our program. To use the blank area on your graph paper worksheet, there is room to create a blank — the CHR$(143) block at (2,8)-(14,16) — and still have an island. In Line 20 add ,a(2). To Line 30 add BG2BL9BD8BL12BU8BR12" after removing the final quotation mark. Create Line 180: GET(2,8)-(14,16),A,G.

As a review make lines 200 and 240 end in PSET, lines 210 and 250 in PRESET, lines 220 and 260 in NOT, and lines 230 and 270 in AND. Then run the program.

What about OR? Change Line 200 from PSET to OR. Then run the program. Nothing new in the two-color PMODE4 screen.

By the way, did you notice and correct the so-called error at the end of Line 31? It has ,1,1 missing. If you copied faithfully and didn't correct it, you just learned something new.

EDIT31 and press ENTER. Then press the space bar until the cursor is under the comma after (13,1) and press D. Then press the space bar until the cursor is under the next comma after the coordinates. Press D and repeat this to the end of the line. Then run the program.

The acid test: Enter EDIT31 and remove ,1,1 in the first statement. Then run the program. The real acid test is to replace the color instructions to read ,0,1 in the first PAINT statement only. Then run the program. Do you see that?

By pursuing an apparent error, you tighten up the program even more. You just learned that if you are using default colors in PMODE4, you can save a lot of bother and not type them in at all. In addition, no matter what color is in a previously defined statement, if you do not indicate the chosen colors, the CoCo uses the default colors (,1,1) in the two-color mode.

If you experiment in at least a two-color set, PAINT works to a degree like CIRCLE. First EDIT Line 31 and remove ,0,1 in the first statement. Add to the end of Line 31 ,,1 or ,1. Reason these out for yourself.

This is a fine example of checking out — not correcting — harmless mistakes. You never know what you will find out or where it will lead you.

Back to the drawing board. Remove :SCREEN1,1 from Line 10 to hide the dirty laundry. You may delete lines 200 through 270. If you do not, bypass this section with:

```
199 GOTO 300
300 X=128:Y=96
```

Whenever you plan to use GET/PUT, it is wise to set *x,y* to some numerical value. When you create a design, you can maneuver the whole mess all over the screen. Our plan is to use PRESET H; E; G; F; GETS to make a four-unit cross in the middle of the screen.

By pursuing an apparent error, you tighten up the program even more. You never know what you will find out or where it will lead you.

On graph paper block out an area 16-by-24 in size. Divide it into four equal quadrants with a cross-hair to make the outline of the four graphics boxes. The first order of business is to locate *x,y* so the design is centered. This important point is where the cross-hairs intersect — not in the upper left corner of the 16-by-24 block. Mark the point in pencil. Label it *x,y*. It is the point of origin of the entire design. It is also the point of origin of the graphics character. Put a dot in the lower right corner of the 8-by-12 oblong. Label the ending coordinates. In large letters lightly write in the box the name of the variable you intend to use. (Outline the shape lightly if you desire). Add PR for PRESET or P for PSET as a subscript. Work out the other boxes on your own.

You are all set to calculate PUT statements in lines 310 through 340. Without looking at the listing, use the worksheet statements to create the four PUT lines 310 through 340. Then run the program.

I decided to make a reverse image and see how it looks. List lines 310 through 340. Copy the PUT statements into lines 360 through 390, and change PRESET to PSET. Then run the program.

There needs to be a pause to digest the cross. If you plan to make any more designs, use the pause more than once. This calls for a GOSUB routine to save memory, typing time and possible errors that tend to crop up in innocent program lines. Type in lines 2000, 345 and 395. Then run the program.

Eager to continue but lazy enough not to want to figure out new coordinates, list lines 360 through 390. Copy the contents of the four lines into lines 410 through 440, changing the lines to read B, B1, B1 and B respectively, all PSET. Type in Line 445, then run the program.

Now list lines 410 through 440. Copy them into lines 460 through 490, using only the C variable; the first two lines PRESET and the last two PSET. Type in Line 495. Then run the program.

One more and that's it! List lines 460 through 490. Copy into lines 510 through 540 the PUT statements from above. Use Variable D only; first and third lines, PSET and second and fourth, PRESET. Type in Line 545 and run the program.

You shouldn't have copied from the listing but from the listed PUT lines on the screen. List Line 541. The equivalent numbered coordinates are placed, (reverse PRESET and PSET), in masked REM lines for reference. Do not activate them. If you do and decide to move your grand design elsewhere, guess what you will be leaving behind.

To see how this creative effort looks in a perpetual loop, type in Line 55 and run the program.

How would it look if you randomly begin at any of the five routines? Who knows, so let's try it. Type in lines 305 and 550, both unmasked, and run the program. It's a dead end so mask lines 305 and 550.

To make the guy tumble across the screen, type in lines 303 and 547, both unmasked. Then run the program. It is annoying to have the residue on the screen. Use the coordinates from the worksheet to make things easier. To get rid of it, type in:

```
LINE 546,LINE(X-8,Y-12)(X+8,Y+12
),PRESET,BF
```

Although the units are centered around the point of origin of the four-unit design,

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it needs to be adjusted upward -6 to be centered vertically on the screen. In Line 300 change 96 to 90. Then run the program.

Mask lines 303 and 547. Leave Line 300 alone. Unmask lines 511, 521, 531 and 541. Then run the program.

The unmasked locations are not in the same location as the *x,y* movable design. It is spinning like a screw — that gives me an idea. First CSAVE your work, then add:

```
303 FOR Y=12 TO 168 STEP6
```

Mask Line 305, and in lines 310 through 340 change the variables to B1, B, B1 and B respectively — all PRESET. Mask Line 345 and change lines 360 and 390 to end with D,PSET and lines 370 and 380 to end with D,PRESET. Mask Line 395 and list lines 310 through 340. Copy them into lines 410 through 440 exactly as listed. Now add:

```
441 PUT(X-2,Y+8)-(X+2,Y+20),E,PS
ET
```

Mask Line 445. Now list lines 310 through 340. Copy them into lines 460 through 490 exactly as listed. List Line 441 and copy it exactly into Line 491. Mask Line 495 and add:

```
497 GOTO 547
547 NEXTY:PCLS:GOSUB2000:GOTO303
```

Then run the program.

A drill is spinning like mad, boring away. Note the drill-point, then list Line 441. There is an error in the ending coordinate. Compare it with Line 140. The X component is only four units wide. The result is junk. I was looking for a sharp point of some kind. I made a mistake and profited from it. This is an example of latching onto distorted junk, which is easy to produce. There is no way to produce as neat a drill head. That is not to say you couldn't make a creditable drill bit using DRAW.

If you get lost along the way, Listing 3, a stripped-down version of Listing 2, produces the spinning drill. It requires a lot of revising but should take only a few minutes of editing.

Lines 303 and 547 confine the action to the included lines. You began at the top of the screen and drilled down 6 units at a time by using STEP6. You masked all the pause routines within the FOR/NEXT loop so as not to slow down the apparent spin motion. You changed only the variables and PSET/PRESET in all of the PUT statements. Lines 360 through 390 created the shaft of the drill. The groups of PUT statements — 310 through 340, 410, 440 and 460 through 490 — set the variables B and B1 to give a sense of rotation. Lines 441 and 491 used the distorted PUT junk to give the sensation of a rotating bit. Line 497 bypassed the unused routine.

Remember, it didn't cost you a cent — only an inquiring mind. The drill may not be art, but it is animation. Some programmers make an interesting design once in a blue moon. You are well on your way to making beautiful graphics all the time. ❑

16KECB

Listing 1: FLASHES

```
0 'LISTING1
10 PMODE4,1:PCLS
20 DIM B(2),C(2),D(2),E(2),F(2),
G(2),H(2),B1(2)
30 DRAW"BM0,0ND6R4ND6BR8ND6R4ND6
BRND6R8ND6BRND12R4D12NL4BDND12R4
D6L8D6NR4BLNU6L4U12L4D6NR8BHND6L
4D6NR4BL8NU6L4U6NR4BU12R4BR8R4BR
R8"
31 PAINT(1,1),1,1:PAINT(13,1),1,
1:PAINT(13,19),1,1:PAINT(1,19),1
,1:PAINT(18,1),1,1:PAINT(27,1),1
,1:PAINT(18,14),1,1:PAINT(22,20)
,1,1:PAINT(31,14),1,1:PAINT(27,2
0)
100 GET(17,13)-(25,25),B,G
110 GET(26,13)-(34,25),B1,G
120 GET(17,0)-(25,12),C,G
130 GET(26,0)-(34,12),D,G
140 GET(8,0)-(16,12),E,G
150 GET(8,12)-(16,24),F,G
160 GET(0,12)-(8,24),G,G
170 GET(0,0)-(8,12),H,G
198 PCLS:SCREEN1,1
199 GOTO300
200 PUT(100,100)-(108,112),B,PSE
T
210 PUT(110,100)-(118,112),B1,PS
ET
220 PUT(120,100)-(128,112),C,PSE
T
230 PUT(130,100)-(138,112),D,PSE
T
240 PUT(140,100)-(148,112),E,PSE
T
250 PUT(150,100)-(158,112),F,PSE
T
260 PUT(160,100)-(168,112),G,PSE
T
270 PUT(170,100)-(178,112),H,PSE
T
300 X=128:Y=96
303 'FOR X=20 TO 236 STEP 18
305 Q=RND(5):ON Q GOTO 310,360,4
10,460,510
310 PUT(X-8,Y-12)-(X,Y),H,PRESET
320 PUT(X,Y-12)-(X+8,Y),E,PRESET
330 PUT(X-8,Y)-(X,Y+12),G,PRESET
340 PUT(X,Y)-(X+8,Y+12),F,PRESET
345 GOSUB2000
350 '***
360 PUT(X-8,Y-12)-(X,Y),H,PSET
370 PUT(X,Y-12)-(X+8,Y),E,PSET
380 PUT(X-8,Y)-(X,Y+12),G,PSET
390 PUT(X,Y)-(X+8,Y+12),F,PSET
395 GOSUB2000
400 '***
410 PUT(X-8,Y-12)-(X,Y),B,PSET
420 PUT(X,Y-12)-(X+8,Y),B1,PSET
430 PUT(X-8,Y)-(X,Y+12),B1,PSET
440 PUT(X,Y)-(X+8,Y+12),B,PSET
445 GOSUB2000
450 '***
460 PUT(X-8,Y-12)-(X,Y),C,PRESET
470 PUT(X,Y-12)-(X+8,Y),C,PRESET
480 PUT(X-8,Y)-(X,Y+12),C,PSET
490 PUT(X,Y)-(X+8,Y+12),C,PSET
495 GOSUB2000
500 '***
510 PUT(X-8,Y-12)-(X,Y),D,PSET
511 'PUT(120,84)-(128,96),D,PRES
ET
520 PUT(X,Y-12)-(X+8,Y),D,PRESET
521 'PUT(128,84)-(136,96),D,PSET
530 PUT(X-8,Y)-(X,Y+12),D,PSET
531 'PUT(120,96)-(128,108),D,PRE
SET
540 PUT(X,Y)-(X+8,Y+12),D,PRESET
541 'PUT(128,96)-(136,108),D,PSE
T
545 GOSUB2000
547 'NEXTX:PCLS:GOTO303
550 'GOTO305
555 GOTO310
1000 GOTO1000
2000 FOR Z=1 TO 50:NEXT:RETURN
```

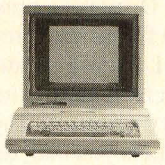
Listing 2: DRILL1

```
0 'LISTING2
10 PMODE4,1:PCLS
20 DIM B(2),C(2),D(2),E(2),F(2),
G(2),H(2),B1(2)
30 DRAW"BM0,0ND6R4ND6BR8ND6R4ND6
BRND6R8ND6BRND12R4D12NL4BDND12R4
D6L8D6NR4BLNU6L4U12L4D6NR8BHND6L
4D6NR4BL8NU6L4U6NR4BU12R4BR8R4BR
R8"
31 PAINT(1,1),1,1:PAINT(13,1),1,
1:PAINT(13,19),1,1:PAINT(1,19),1
,1:PAINT(18,1),1,1:PAINT(27,1),1
,1:PAINT(18,14),1,1:PAINT(22,20)
,1,1:PAINT(31,14),1,1:PAINT(27,2
0)
100 GET(17,13)-(25,25),B,G
110 GET(26,13)-(34,25),B1,G
120 GET(17,0)-(25,12),C,G
130 GET(26,0)-(34,12),D,G
140 GET(8,0)-(16,12),E,G
150 GET(8,12)-(16,24),F,G
160 GET(0,12)-(8,24),G,G
170 GET(0,0)-(8,12),H,G
198 PCLS:SCREEN1,1
199 GOTO300
200 PUT(100,100)-(108,112),B,PSE
T
210 PUT(110,100)-(118,112),B1,PS
ET
220 PUT(120,100)-(128,112),C,PSE
T
230 PUT(130,100)-(138,112),D,PSE
T
240 PUT(140,100)-(148,112),E,PSE
T
250 PUT(150,100)-(158,112),F,PSE
T
260 PUT(160,100)-(168,112),G,PSE
T
270 PUT(170,100)-(178,112),H,PSE
T
```

```
300 X=128:Y=12
303 FOR Y=12TO 168 STEP6
305 'Q=RND(5):ON Q GOTO 310,360,
410,460,510
310 PUT(X-8,Y-12)-(X,Y),B1,PRESE
T
320 PUT(X,Y-12)-(X+8,Y),B,PRESET
330 PUT(X-8,Y)-(X,Y+12),B1,PRESE
T
340 PUT(X,Y)-(X+8,Y+12),B,PRESET
345 GOSUB2000
350 '***
360 PUT(X-8,Y-12)-(X,Y),D,PSET
370 PUT(X,Y-12)-(X+8,Y),D,PRESET
380 PUT(X-8,Y)-(X,Y+12),D,PRESET
390 PUT(X,Y)-(X+8,Y+12),D,PSET
400 '***
410 PUT(X-8,Y-12)-(X,Y),B1,PRESE
T
420 PUT(X,Y-12)-(X+8,Y),B,PRESET
430 PUT(X-8,Y)-(X,Y+12),B1,PRESE
T
440 PUT(X,Y)-(X+8,Y+12),B,PRESET
441 PUT(X-2,Y+8)-(X+2,Y+20),E,PS
ET
445 GOSUB2000
450 '***
460 PUT(X-8,Y-12)-(X,Y),B1,PRESE
T
470 PUT(X,Y-12)-(X+8,Y),B,PRESET
480 PUT(X-8,Y)-(X,Y+12),B1,PRESE
T
490 PUT(X,Y)-(X+8,Y+12),B,PRESET
491 PUT(X-2,Y+8)-(X+2,Y+20),E,PS
ET
495 GOSUB2000
497 GOTO547
500 '***
510 PUT(X-8,Y-12)-(X,Y),D,PSET
520 PUT(X,Y-12)-(X+8,Y),D,PRESET
530 PUT(X-8,Y)-(X,Y+12),D,PRESET
540 PUT(X,Y)-(X+8,Y+12),D,PSET
545 GOSUB2000
547 NEXTY:PCLS:GOTO303
550 'GOTO305
555 GOTO310
1000 GOTO1000
2000 FOR Z=1 TO 50:NEXT:RETURN
```

Listing 3: DRILL2

```
0 'LISTING3
10 PMODE4,1:PCLS
20 DIM B(2),C(2),D(2),E(2),F(2),
G(2),H(2),B1(2)
30 DRAW"BM0,0ND6R4ND6BR8ND6R4ND6
BRND6R8ND6BRND12R4D12NL4BDND12R4
D6L8D6NR4BLNU6L4U12L4D6NR8BHND6L
4D6NR4BL8NU6L4U6NR4BU12R4BR8R4BR
R8"
31 PAINT(1,1):PAINT(13,1):PAINT(
13,19):PAINT(1,19):PAINT(18,1):P
AINT(27,1):PAINT(18,14):PAINT(22
,20):PAINT(31,14):PAINT(27,20)
100 GET(17,13)-(25,25),B,G
110 GET(26,13)-(34,25),B1,G
120 GET(17,0)-(25,12),C,G
130 GET(26,0)-(34,12),D,G
140 GET(8,0)-(16,12),E,G
150 GET(8,12)-(16,24),F,G
160 GET(0,12)-(8,24),G,G
170 GET(0,0)-(8,12),H,G
198 PCLS:SCREEN1,1
300 X=128:Y=96
303 FOR Y=12 TO 168 STEP 6
310 PUT(X-8,Y-12)-(X,Y),B1,PRESE
T
320 PUT(X,Y-12)-(X+8,Y),B,PRESET
330 PUT(X-8,Y)-(X,Y+12),B1,PRESE
T
340 PUT(X,Y)-(X+8,Y+12),B,PRESET
350 '***
360 PUT(X-8,Y-12)-(X,Y),D,PSET
370 PUT(X,Y-12)-(X+8,Y),D,PRESET
380 PUT(X-8,Y)-(X,Y+12),D,PRESET
390 PUT(X,Y)-(X+8,Y+12),D,PSET
400 '***
410 PUT(X-8,Y-12)-(X,Y),B1,PRESE
T
420 PUT(X,Y-12)-(X+8,Y),B,PRESET
430 PUT(X-8,Y)-(X,Y+12),B1,PRESE
T
440 PUT(X,Y)-(X+8,Y+12),B,PRESET
441 PUT(X-2,Y+8)-(X+2,Y+20),E,PS
ET
450 '***
460 PUT(X-8,Y-12)-(X,Y),B1,PRESE
T
470 PUT(X,Y-12)-(X+8,Y),B,PRESET
480 PUT(X-8,Y)-(X,Y+12),B1,PRESE
T
490 PUT(X,Y)-(X+8,Y+12),B,PRESET
491 PUT(X-2,Y+8)-(X+2,Y+20),E,PS
ET
547 NEXTY:PCLS:GOSUB2000:GOTO303
2000 FOR Z=1 TO 50:NEXT:RETURN
```

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This program, *CoCoMemo*, was designed to let the user enter recipes, poems or just about any other articles of information into the computer and then save them for future use. *CoCoMemo* was designed to be as self-explanatory and user-friendly as possible.

When you run the program, the screen clears and a copyright message appears at the top of the screen, followed by a menu showing nine options. They are as follows:

- Display A File — Displays a previously created *CoCoMemo* file to the screen.
- Create A File — Lets you create a *CoCoMemo* file. A special feature is included here to prevent overwriting existing files.
- Modify A File — Lets you add, delete or change lines of a previously created file.
- Delete A File — Lets you delete a file from a work disk.
- Print A File — Prints any *CoCoMemo* file from disk to the printer.
- See Directory — Displays a directory of all *CoCoMemo* files on the disk.
- Check Free Disk Space — Displays the number of free granules and bytes of a disk to the screen.
- Copy A File — Lets you copy a *CoCoMemo* file from one disk to another. Special features prevent empty files from being copied and overwriting existing files on the target disk.
- Quit — Performs a cold start and returns to Disk BASIC.

At any filename prompt, enter the name of the file you want to work with. The filename may be eight or less characters and must not contain any colons (:), slashes (/), or periods (.). Pressing ENTER returns you to the main menu.

If you select Option 2 or 3, a new set of subcommands will be presented that let you do the following:

- Save the file you are currently working on for future use.
- Delete the line that your arrow cursor is currently positioned on (more on this later).
- Terminate the file you're working on and return to the main menu.

The space bar lets the user enter a 32-character line of text into the line number currently indicated by the arrow cursor. All keys function normally except for the quote (") and CLEAR keys.

The computer keeps track of the information through the use of line numbers (1 through 310). The UP and DOWN arrow keys move the arrow cursor to lower or higher line numbers, respectively. The line number that the cursor is positioned on is indicated by the line number indicator above the text window.

If you don't have an 80-column printer, the print option (Option 5) does not work properly. Also, if your printer doesn't support underlining, delete `CHR$(15)` and `CHR$(14)` from Line 1191. This won't affect the printout much. The two bell characters (`CHR$(7)`) at the end of Line 1191 are to make the printer beep when it is finished printing. By the way, don't renumber the program! *CoCoMemo* is easy to use and should be fairly self-explanatory. Enjoy it and use it to your advantage. ❑

Dave LeBlanc is 14 years old and lives in Caissie Cape, New Brunswick. He is a self-taught programmer who has owned a CoCo for over two years. He enjoys volleyball, basketball, music and programming his CoCo. He can be contacted at P.O. Box 99, Grande-Digue, NB E0A 1S0, Canada; (506) 576-7582.

32K Disk

```
120 ..... 204
290 ..... 16
504 ..... 38
550 ..... 76
710 ..... 98
960 ..... 221
1177 ..... 72
5000 ..... 93
6080 ..... 8
9000 ..... 237
9030 ..... 118
END ..... 106
```

The listing: COCOMEMO

```
0 ' COPYRIGHT 1989 FALSOFT, INC
1 DATA99,111,99,111,109,101,109,
111,32,40,99,41,49,57,56,55,32,9
8,121,32,100,97,118,101,32,108,1
01,98,108,97,110,99
5 C=0:CLS:RESTORE:FORA=1024TO105
5:READ B:IFB>96THENPRINT@C,CHR$(
B);:C=C+1:NEXTELSEPOKEA,B:C=C+1:
NEXT
10 CLEAR10000
20 DIM S$(315),A$(315),NF$(70)
25 POKE282,1
30 PRINT@65,"MENU":PRINT
40 PRINT" <1> DISPLAY A FILE":PR
INT" <2> CREATE A FILE":PRINT" <
3> MODIFY A FILE":PRINT" <4> DEL
ETE A FILE":PRINT" <5> PRINT OUT
 A FILE":PRINT" <6> SEE DIRECTOR
Y":PRINT" <7> CHECK FREE DISK SP
ACE":PRINT" <8> COPY A FILE":PRI
NT" <9> QUIT"
50 PRINT" SELECT (1-9) "
60 POKE65494,0
70 QE$=INKEY$
80 QE$=INKEY$:IF QE$=""THEN80
81 IFQE$<"1"ORQE$>"9"THEN80
82 FORA=1120+(VAL(QE$)*32)TO1120
+(VAL(QE$)*32)+31:POKE A,PEEK(A)
-64:NEXT
```

```
90 IFQE$="1"THEN160
100 IFQE$="2"THEN390
110 IFQE$="3"THEN6000
120 IFQE$="4"THEN1040
130 IFQE$="5"THEN1160
140 IFQE$="6"THEN7000
141 IFQE$="7"THEN1230
142 IFQE$="8"THEN9000
143 IFQE$="9"THEN1270
150 GOTO80
160 PRINT@416,"";:PRINT@416,"";:L
INEINPUT" FILENAME: ";Q1$
170 IFQ1$=""THENRUN10
180 IFLEN(Q1$)>8ORLEN(Q1$)<1THEN
190ELSE GOTO200
190 GOTO160
200 Q1$=Q1$+STRING$(8-LEN(Q1$),3
2):PRINT@448," SEARCHING"
210 GOSUB5000
215 POKE&HFF40,0:POKE&HFF40,1
220 FORD=1TO DF:IF NF$(D)=Q1$ TH
EN260ELSENEXTD
230 PRINT@448," NON-EXISTENT FIL
F":FORD=1TO750:NEXT:RR=FREE(0):R
UN
260 PRINT@448," FOUND":PRINT" LO
ADING";:FORD=1TO1000:NEXT:CLS
270 A$="":OPEN"D",#2,Q1$+".MEM",
35
280 E=1
290 IF E>LOF(2)THEN350
300 GET #2,E
310 INPUT#2,A$
311 IFLEN(A$)=32THENPRINTA$;:GOT
0330ELSEPRINTA$:GOTO330
320 PRINTA$
330 E=E+1
340 GOTO290
350 CLOSE#1
360 PRINT"HIT ANY KEY CONTINUE":
QE$=INKEY$
370 QE$=INKEY$:IFQE$=""THEN370
380 RUN
390 REM
400 FL=0:PRINT@416,"":PRINT@416,
"";:LINEINPUT" FILENAME: ";F1$
410 IFF1$=""THENRUN10
420 IFLEN(F1$)>8ORLEN(F1$)<1THEN
430ELSEGOTO440
430 GOTO400
440 F1$=F1$+STRING$(8-LEN(F1$),3
2):PRINT" SEARCHING":GOSUB5000
450 FORD=1TO DF:IFNF$(D)=F1$ THE
N500ELSENEXT
490 PRINT@448," READY.":GOTO510
500 PRINT@448," FOUND":PRINT" DO
 YOU WISH TO OVERWRITE IT?";
501 QE$=INKEY$
502 QE$=INKEY$:IFQE$=""THEN502
503 IFQE$="N"THENPRINT@480,STRIN
G$(30,32);:PRINT@448,STRING$(30,
32);:GOTO390
504 IFQE$="Y"THENPRINT@480,STRIN
G$(30,32);:PRINT@448," READY.":K
ILL F1$+".MEM":GOTO510
505 GOTO502
510 POKE282,0:FORPP=1024TO1535:P
OKEPP,32:NEXTPP
520 RR=FREE(0):U=22:PRINT@12,"fi
lename";:FORPP=LEN(F1$)TO1STEP-1
:PRINT@U,CHR$(ASC(RIGHT$(F1$,PP)
)+32);:U=U+1:NEXTPP:POKE1044,58:
U=1085:FORQQ=2TOLEN(STR$(RR)):S=
VAL(MID$(STR$(RR),QQ,1)):P=S+48:
POKE U,P:U=U+1:NEXTQQ:PRINT@44,"
free disk space";:POKE1072,32
525 FORPP=1024TO1065:IFPEEK(PP)=
64THENPOKE PP,32:NEXTPP ELSENEXT
PP
530 POKE1077,32:POKE1083,58:PRIN
T@76,"line";:POKE1105,35:PRINT@9
6,"select command";:POKE1126,32:
PRINT@128:PRINT@160:POKE1249,49:
POKE1281,50:POKE1313,51:FORPP=12
50TO1314STEP32:POKEPP,45:NEXTPP:
PRINT@228,"save";
540 PRINT@260,"delete a line";:P
RINT@292,"terminate file";:POKE1
325,32
550 PRINT@321,"SPACEBAR";:PRINT@
331,"enter text";:POKE1353,45:PO
KE1360,32:PRINT@128,"";:POKE1290
,32:POKE1292,32:IF FL=1THEN570EL
SE560
560 OPEN"D",#1,F1$+".MEM",35:T=1
570 PRINT@160:PRINT@128,"> ";S$(
T)
580 U=1107:FORPP=2TOLEN(STR$(T))
:S=VAL(MID$(STR$(T),PP,1))+48:PO
KEU,S:POKEU+1,32:U=U+1:NEXTPP
590 GOSUB770
600 E$=""
610 PRINT@96,"enter text";:POKE1
125,32:POKE1130,32:POKE1131,32:P
OKE1132,32:POKE1133,32:PRINT@128
:PRINT@160:PRINT@128,"";:E$="":G
OSUB10000
620 REM
```

LOTTERY

MADE EASY

Most people spend $5.00 to $25.00 dollars or more on their favorite lottery. Most of this money is spent on purchasing easy picks. The reason for this is that most people don't have the time or they have a hard time thinking up all the different combinations of numbers.

If you have a Color Computer 3, one Disk drive, and a CM8 or RGB monitor this program can help you. (Printer optional)

This program offers several ways to play the lottery. There is a Pick 7, Pick 7/6, Pick 8, Pick 12, and a Pick 20. The program is menu driven and has a Special feature that will identify winning numbers at a glance. Why not take the lottery challenge & play with your own numbers?

This program is made available by the RRA & CO. at the cost of $15.00, this includes postage & handling.

Send check or money order to. . RRA & CO.
P.O. Box 17087
Des Moines, Iowa
zip 50317

(money orders shipped same day)

Nine-Times

The first magazine devoted exclusively to OS-9!

Every other month you will receive a disk *jam-packed* with programs and articles *all* for **OS-9**.

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Back Issue, ea. $7.00 Foreign postage, add $1.50 ea.

Magazine Source: Due to many inquiries, the source code for the magazine graphic shell is being provided as an informational tool. Included is the actual Basic09 source code and compiled modules on disk, as well as documentation and a printed copy of the source code.

Source, $24.95 Foreign postage, add $1.50

To order, please send U.S. check or money order to:
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Youngstown, OH 44512

Technical Assistance: (216)-758-7694

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Checks, allow 3 weeks for receipt of first issue/back issue.

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```
630 S$(T)=E$
640 T=T+1:IFT<G THEN650ELSE G=T:
GOTO650
650 PRINT@128,"> "+S$(T)
660 GOTO580
670 CLOSE#1:KILL F1$+".MEM":OPEN
"D",#1,F1$+".MEM",35
675 IFG=0THEN750ELSE Y=1:Z=1
680 IF S$(Y)="PSUNIA"THEN750
690 IF S$(Y)=""THEN730
700 WRITE #1,S$(Y)
710 PUT #1,Z
720 Z=Z+1
730 Y=Y+1
740 GOTO680
750 CLOSE #1
760 RUN
770 M$=INKEY$:PRINT@96,"select";
:PRINT@103,"command";:POKE1126,3
2:
780 M$=INKEY$:IFM$=""THEN780
790 IFM$="1"THEN860
800 IFM$="2"THEN890
810 IFM$="3"THEN940
820 IFM$=" "THENRETURN
830 IFM$="^"THEN970
840 IFM$=CHR$(10)THEN1010
850 GOTO780
860 FORP=1120TO1140:POKEP,32:NEX
TP:PRINT@96,"saving";:FORP=1126T
O1128:POKEP,46:NEXTP
870 S$(G+1)="PSUNIA"
880 GOTO670
890 REM
900 S$(T)=""
910 PRINT@160
920 PRINT@128,"> "
930 GOTO650
940 PRINT@96,"deleting file";:PO
KE1128,32:FORP=1133TO1135:POKEP,
46:NEXTP
950 CLOSE#1:KILL F1$+"/MEM"
960 RUN
970 IFT=1THEN580
980 T=T-1:PRINT@128,"":PRINT@160
,""
990 PRINT@128,"> "+S$(T)
1000 GOTO580
1010 T=T+1:PRINT@128,"":PRINT@16
0,""
1020 PRINT@128,"> "+S$(T)
1030 GOTO580
1040 PRINT@416,"":PRINT@416,"";:
LINEINPUT" FILENAME: ";Q$
1050 IFQ$=""THENRUN10
1060 IFLEN(Q$)>8ORLEN(Q$)<1THEN1
040ELSE1070
1070 PRINT" SEARCHING":Q$=Q$+STR
ING$(8-LEN(Q$),32):GOSUB5000
1080 FORD=1TO DF:IF NF$(D)=Q$ TH
EN1130ELSE NEXTD
1120 PRINT@448," NON-EXISTENT FI
LE":FORD=1TO1000:NEXT:RUN
1130 PRINT@448," FOUND":PRINT" D
ELETING";
1140 KILL Q$+".MEM":RUN
1160 GOTO8000
1170 OPEN"D",#1,F$+".MEM",35
1174 CLS
1175 IFPEEK(65314)<>5THEN1179
1176 IFPEEK(65314)<>5THEN1178
1177 PRINT@32," PLEASE GET PRINT
ER READY":GOTO1176
1178 REM
1179 REM
1180 FOR CD=1TO LOF(1):GET#1,CD:
INPUT#1,A$(CD):NEXT
1190 CLS:LINEINPUT"ENTER APPROPR
IATE TITLE          > ";B$:CLS:PR
INT:PRINTTAB(12);"PRINTING"
1191 DV=INT(LOF(1)/2)+1:CLOSE#1:
PRINT#-2,TAB(40-LEN(B$)/2);CHR$(
15);B$CHR$(14);:PRINT#-2:FOR G1=
1TO DV:PRINT#-2,TAB(5);A$(G1);TA
B(42);A$(DV+G1):NEXT:PRINT#-2,CH
R$(7);:FORA=1TO50:NEXTA:PRINT#-2
,CHR$(7)
1200 RUN
1210 QE$=INKEY$:IFQE$=""THEN1210
1220 RUN
1230 CLS:PRINT" FREE DISK SPACE:
"
1240 RR=FREE(0):PRINT"IN GRANULE
S:"RR:PRINT"IN BYTES:"RR*2304:PR
INT"ROOM FOR APPROXIMATELY"RR"FI
LES.";:PRINT"HIT ANY KEY TO CONT
INUE":QE$=INKEY$
1250 QE$=INKEY$:IFQE$=""THEN1250
1260 RUN
1270 POKE113,0:EXEC40999
5000 DF=0:FOR XX=3TO11:DSKI$0,17
,XX,Y$,Z$:FOR X1=1TO128STEP32:GO
SUB5010:NEXT X1:Y$=Z$:FOR X1=1TO
128STEP32:GOSUB5010:NEXT X1,XX
5002 RETURN
5010 LL$=MID$(Y$,X1,14):IFASC(LL
$)=255ORASC(LL$)=0THENRETURNELSE
5020
5020 IFMID$(LL$,9,3)<>"MEM"THENR
ETURNELSE5021
5021 DF=DF+1:NF$(DF)=LEFT$(LL$,8
):RETURN
6000 FL=1:PRINT@416,"":PRINT@416
,"";:LINEINPUT" FILENAME: ";F1$
6010 IFF1$=""THENRUN10
6020 IFLEN(F1$)<1ORLEN(F1$)>8THE
N6000
6030 F1$=F1$+STRING$(8-LEN(F1$),
32):PRINT@448," SEARCHING":GOSUB
5000
6040 FORD=1TO DF:IF NF$(D)=F1$ T
HEN6060ELSENEXT
6050 PRINT@448," NON-EXISTENT FI
LE":FORD=1TO750:NEXT:RUN
6060 PRINT@448," FOUND":PRINT@48
0," LOADING";
6070 OPEN"D",#1,F1$+".MEM",35:T=
LOF(1)
6075 IFLOF(1)<1THENG=1:T=1:PRINT
@448,"":PRINT@480,"
                    ";:PRINT@448,"
READY.":GOTO510
6080 FORD=1TO LOF(1):GET#1,D:INP
UT#1,S$(D):NEXTD:G=LOF(1):PRINT@
448,"":PRINT@480,"                ";
:PRINT@448," READY.":GOTO510
7000 CLS:PRINT:PRINT" READING DI
RECTORY":PRINT@32,"";:GOSUB5000
7010 FORD=1TO DF STEP3:PRINTTAB(
1);NF$(D);TAB(12);NF$(D+1);TAB(2
3);NF$(D+2):NEXTD
7020 PRINT" HIT ANY KEY TO CONTI
NUE";
7030 A$=INKEY$
7040 A$=INKEY$:IFA$=""THEN7040
7050 RUN
8000 PRINT@416,"":PRINT@416,"";:
LINEINPUT" FILENAME: ";F$
8010 IFF$=""THENRUN10
8020 IFLEN(F$)>8ORLEN(F$)<1THEN8
000
8030 F$=F$+STRING$(8-LEN(F$),32)
:PRINT@448," SEARCHING":GOSUB500
0
8040 FORD=1TO DF:IF NF$(D)=F$ TH
EN8060ELSE NEXTD
8050 PRINT@448," NON-EXISTENT FI
LE":FORD=1TO1000:NEXT:RUN
8060 PRINT@448," FOUND":PRINT" L
OADING";:FORD=1TO750:NEXT:GOTO11
70
9000 PRINT@416,"":PRINT@416,"";:
LINEINPUT" FILENAME: ";F$
9001 IFF$=""THENRUN10ELSEIFLEN(F
$)<1ORLEN(F$)>8THEN9000ELSE9002
PRINT@448," SEARCHING":F$=F
$+STRING$(8-LEN(F$),32):GOSUB500
0
9003 FORD=1TO DF:IFNF$(D)=F$THEN
9010ELSENEXTD
9004 PRINT@448," NON EXISTENT FI
LE":FORD=1TO1000:NEXTD:RUN
9010 PRINT@448," FOUND":PRINT@48
0," LOADING";:OPEN"D",#1,F$+".ME
M",35
9015 IFLOF(1)<1THEN9500
9020 E=LOF(1):FORD=1TO LOF(1):GE
T#1,D:INPUT#1,A$(D):NEXT:CLOSE#1
9030 PRINT@448," INSERT TARGET D
ISK AND":PRINT@480," STRIKE ANY
KEY >";:SOUND100,3:EXEC41329
9040 PRINT@448," SEARCHING":PRIN
T@480,"
";:GOSUB5000
9050 FORD=1TO DF:IFNF$(D)=F$ THE
N9100ELSE NEXTD
9060 PRINT@480,"
                ";:PRINT@448," COP
YING":OPEN"D",#1,F$+".MEM",35
9070 FORD=1TO E:WRITE#1,A$(D):PU
T#1,D:NEXTD:CLOSE#1
9080 RUN
9100 PRINT@448," FILE FOUND":PRI
NT@480," DO YOU WISH TO OVERWRIT
E IT?";
9105 QE$=INKEY$
9106 QE$=INKEY$:IFQE$=""THEN9106
9107 IFQE$="N"THENRUN
9108 IFQE$="Y"THEN KILL F$+".MEM
":GOTO9060ELSE9109
9109 GOTO9106
9500 PRINT@480,"              ";:PRI
NT@448," NULL FILE":CLOSE#1:FORD
=1TO1000:NEXTD:RUN
10000 PRINTCHR$(134);:FORQE=1TO5
0:QE$=INKEY$:IFQE$<>""THEN10002E
LSENEXTQE
10001 PRINTCHR$(8);CHR$(137);:FO
RQE=1TO50:QE$=INKEY$:IFQE$<>""TH
EN10002ELSENEXT:PRINTCHR$(8);:GO
TO10000
10002 IFASC(QE$)=8THEN10010ELSEI
FASC(QE$)=21THEN10015ELSE10003
10003 IFASC(QE$)=13THENPRINT@160
,"":PRINT@128,"":RETURNELSEIFASC
(QE$)<32ORASC(QE$)>127ORASC(QE$)
=34THENSOUND200,1:GOTO10001ELSE1
0004
10004 IFLEN(E$)=>32THENSOUND147,
1:GOTO10001ELSE10005
10005 E$=E$+QE$:PRINTCHR$(8);QE$
;:GOTO10000
10010 IFLEN(E$)=<0THENSOUND147,1
:GOTO10001
10011 PRINTCHR$(8);CHR$(8);:E$=L
EFT$(E$,LEN(E$)-1):GOTO10000
10015 IFLEN(E$)<=0THENSOUND147,1
:GOTO10001ELSE E$="":PRINT@160,"
":PRINT@128,"":PRINT@128,"";:GOT
O10000
```

Sugar Software

☞ New Calligrapher Graphics Clipix! ☜

Introducing 8 disks of graphics pictures I call **Clipix**. Each disk has over 60 pictures. The introductory price of **just $49.95** (save $30) for the complete set is available through Dec. 31st, 1989. Specify RS-DOS, OS9 or MS-DOS format.

CALLIGRAPHER

CoCo Calligrapher - Turn your CoCo and dot-matrix printer into a calligrapher's quill. Make beautiful invitations, flyers, certificates, labels and more. Includes three ½ inch high fonts. Works with many printers such as Epson, Gemini and Radio Shack. Over 135 additional fonts are available (see below). Tape/Disk (RS-DOS); **$24.95**.

Calligrapher V2.0 - Prints all the same fonts as the CoCo Calligrapher. It reads a standard text file which contains text and formatting codes. You specify the fonts, centering, left, right or full justify, line fill, margin, line width, page size, page break, page numbers, indentation, multiple columns, macros, headers, footers and more. Includes the same 3 fonts with additional fonts available below. Disk only; Specify OS9 or MS-DOS; **$24.95**.

Calligrapher Fonts - Requires Calligrapher above. Each set on tape or disk with 8 to 10 fonts; Specify RS-DOS, OS9 or MS-DOS format; **$14.95** each:

- **Set #1** Reduced and reversed originals;
- **Set #2** Old Style and Broadway;
- **Set #3** Antique and Business;
- **Set #4** Wild West and Checkers;
- **Set #5** Stars, Hebrew and Victorian;
- **Set #6** Block and Computer;
- **Set #7** Small: Roman, Italics, Cubes, etc;
- **Set #8** Novelty fonts;
- **Set #9** Gallant and Spartan;
- **Set #10** Several Roman fonts;
- **Set #11** Gothic and Script;
- **Set #12** More Roman and Italic;
- **Set #13** Several Courier fonts;
- **Set #14** Modern and Screen;
- **Set #15** Tektron and Prestige.

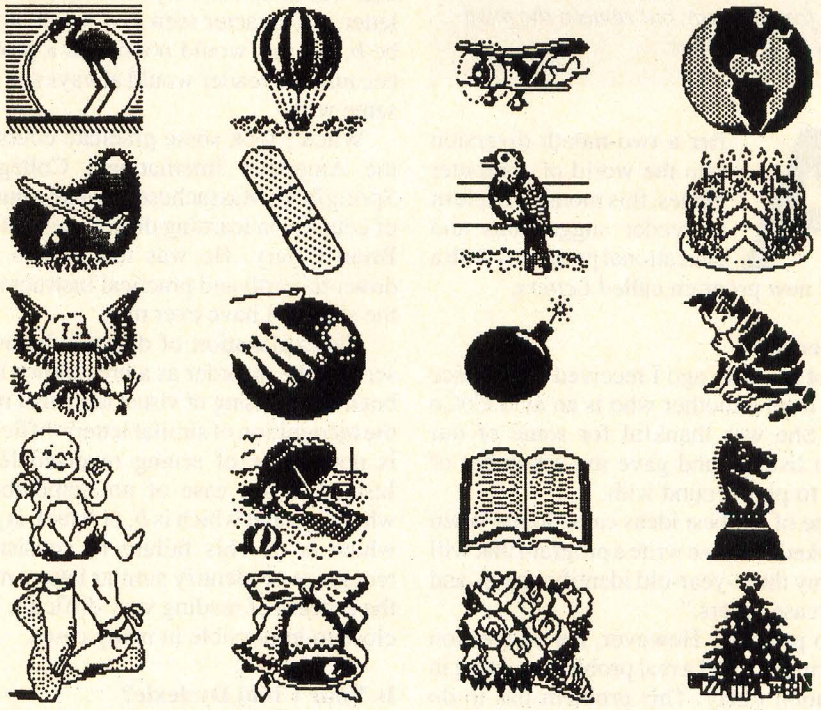
Economy Font Packages available on disk only, with 25 to 30 fonts; Specify RS-DOS, OS9 or MS-DOS format; **29.95** for any one or save by buying two or more at **$19.95** each:

- **Pkg #1** - Above font sets 1, 2 and 3;
- **Pkg #2** - Above font sets 4, 5 and 6;
- **Pkg #3** - Above font sets 7, 8 and 9;
- **Pkg #4** - Above font sets 10, 11 and 12;
- **Pkg #5** - Above font sets 13, 14 and 15.

Calligrapher Combo Package - Includes the Calligrapher and any two Economy Font Packages (your choice) for only **$59.95**. Specify RS-DOS, OS9 or MS-DOS.

New! Calligrapher Graphics Clipix

The Calligrapher may now include graphics pictures, known as **Clipix**, along with the text it prints. There are currently 8 different Clipix disks available, each one has over 60 different graphic symbols. While the OS9/MS-DOS Calligrapher (especially V2.0) may easily combine both text and Clipix, the RS-DOS Calligrapher may also print out the Clipix. Clipix #1) **Sports**, #2, **Miscellaneous**, #3) **Occupations**, #4) **Occasions**, #5) **Vehicles**, #6) **KidStuff**, #7) **Astrology/Mythology**, #8) **Animals**. Each Clipix disk is **$9.95**. *See special offer above.*



The Font Massager - This program allows you to do many things to Calligrapher font and Clipix files. Create new fonts, modify existing fonts, invert and compress fonts, double the height and/or width, halve the height and/or width and convert between RS-DOS and OS9/MS-DOS formats. Specify OS9 or MS-DOS; **$19.95**.

This is a sample of the dot-matrix printer output from the OS9 MS-DOS Calligrapher set to full-justify the text within a 2.2 inch wide column. The font used is the 12-point Courier font from the font set #15 (or package #5).

For a complete catalog of Sugar Software products and fonts, send a stamp and a label.

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All programs run on the CoCo 1, 2 and 3, 32K Extended Basic, unless otherwise noted. Add $1.50 per tape or disk for shipping and handling. Florida residents add 6% sales tax. COD orders add $5. Dealer inquiries invited. Orders generally shipped in 24-48 hours. No refunds or exchanges without prior authorization.

Learning Letters

by Fred B. Scerbo
Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

After a two-month diversion into the world of computer games, this month we return to reader suggestions and educational programs with a brand new program called *Letters*.

Reader Mail

Not too long ago I received a very nice letter from a mother who is an avid CoCo user. She was thankful for some of our recent listings and gave me a number of ideas to play around with.

One of the best ideas came to me when she asked, "Please write a program that will help my three-year-old identify upper- and lowercase letters."

No problem. However, her suggestion did bring to mind a real problem existing in education today. This problem has to do with some common misconceptions about a much misunderstood learning disability — dyslexia.

What Is Dyslexia?

Ask a person on the street what dyslexia is and the response is probably something like, "it causes a person to see letters in reverse or rotating around the printed page."

For some reason many people believe dyslexics look at the word *bed* and see *deb*. Or they look at *pad* and instead see *baq*.

This is a gross oversimplification. If a person always saw a *b* when a *d* is printed, that would be the only reference to either letter. A character seen as *d* would always be *b*, but this would not create a problem because the reader would always see it the same way.

When I took some graduate courses at the American International College in Springfield, Massachusetts, I had a number of courses on learning disabilities with Dr. Brian Cleary. He was one of the most down-to-earth and practical instructors on the subject I have ever met.

His explanation of dyslexia better described the disorder as a breakdown in the brain's processing of visual input that makes the recognition of similar letters difficult. It is not a case of seeing reversed letters. Instead it is a case of not remembering which is *d* and which is *b*, or which is *p* and which is *q*. This failure to consistently recognize or identify similar letters makes the process of reading very difficult, if not close to impossible in many cases.

Is Your Child Dyslexic?

Not too many years ago a parent I met suggested her five-year-old child might be dyslexic because he reversed some letters. Reversals do not mean dyslexia. A diagnosis of true dyslexia requires some lengthy testing by specialists. I told the mother not to worry yet. Most preschoolers show some reversals when they are just learning to identify letters. Most overcome this as they mature and begin a solid reading program.

If you have legitimate fears your child may have a learning disorder, contact your school system and request an evaluation under Public Law 94-142, the Federal Special Needs Civil Rights Law.

If you find your child does have a disorder, it is not the end of the world. Your school system should be able to provide a program that helps your child learn according to his or her needs and abilities.

The Program

Letters is designed to help nip some of these early problems in the bud. It is designed for youngsters three and up who are just learning their ABCs. It is not intended to be used alone by a youngster. An adult should stand over the student while the program is running in order to help the student read letters as they appear onscreen.

The program reviews the twenty-six letters of the alphabet using the format first developed for the program *Opposites* and later repeated in many of our other recent educational programs.

Upon running the program, press ENTER to advance to the menu. Press A to run through the twenty-six letters in upper- and lowercase. I have used some rather large graphics so youngsters can easily see them, even on a small black and white TV screen. Pressing ENTER allows you to advance through each letter — even a three-year-old can handle pressing ENTER.

Both selections B and C work in the same fashion, but each gives a graphics quiz on either uppercase or lowercase letters. Using the *Opposites* quiz format, a reverse video graphics of a letter appears in the upper left-hand corner. Three other possible matches appear in the remaining boxes.

The user moves the flashing cursor by pressing the space bar, then presses ENTER when the cursor is on the correct match. Pressing the @ key gives you the scorecard. Pressing C returns you to where you left off.

Remember, this program is simply a tool. It is not intended as a cure for serious reading problems. The best approach, however, is involvement in your child's learning process. This is the way to ensure any learning disorders or problems your child might have are kept under control.

See you next month. ❑

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

16K ECB

```
85 ..... 42
200 ..... 15
340..... 155
445 ..... 249
560..... 90
END .. 120
```

The listing: UPLOCASE

```
1 REM**************************
2 REM*    UPPER & LOWERCASE    *
3 REM*   COPYRIGHT (C) 1989    *
4 REM*    BY FRED B. SCERBO    *
5 REM*    60 HARDING AVENUE    *
6 REM*  NORTH ADAMS, MA 01247  *
7 REM**************************
10 CLEAR3000
15 CLS0:PRINTSTRING$(32,220);STR
ING$(32,204);:FORI=1TO192:READA:
PRINTCHR$(A+128);:NEXT
20 PRINTSTRING$(32,195);STRING$(
32,211);
25 PRINT@358," AN INTRODUCTION T
O ";:PRINT@390," UPPER &  LOWERC
ASE ";
30 PRINT@422,"  BY FRED B.SCERBO
  ";:PRINT@454," COPYRIGHT (C) 1
989 ";
35 DATA61,56,,48,52,62,60,61,48,
62,61,60,58,53,60,62,61,48,61,60
,60,58,52,62,60,60,61,48,61,60,6
0,61
40 DATA53,,,,48,58,,48,48,48,53,
48,,48,,58,,48,53,48,,48,.58..48
,53,,53,,,53
45 DATA53,,,,48,59,51,,,,53,48,,
,,58,,48,53,51,50,48,48,59,51,51
,55,,53,51,51,51
50 DATA53,,,,48,58,,,,,53,48,,,,
58,,48,53,,,48,,58,52,50,48,.48.
,,53
55 DATA53,,,,48,58,,,,,53,48,,,,
58,,48,53,,,48,.58..52.50,.49,..
53
60 DATA55,51,51,58,49,59,51,55,4
8,.55,50,48,.49,59,48,48,55,51,5
1,58,49,59,48,48,53,48,53,51,51,
55
65 X$=INKEY$:IFX$<>CHR$(13)THEN6
5
70 DIM P$(26,3),A$(6),B$(26),C$(
26),A(26),N(26),B(4),C(4),D(4),E
(4),F(4),AO(26)
75 FORI=1TO3:READ C(I),D(I),E(I)
,F(I):NEXT:FORI=1TO6:READA$(I):N
EXT:FORI=1TO26:READP$(I,1),P$(I,
2):NEXT
80 COLOR1,0
85 CLS:PRINT:PRINTSTRING$(32,"-"
);:PRINT@102,"AN INTRODUCTION TO
":PRINT@132,"UPPER & LOWERCASE L
ETTERS":PRINT@199,"A) REVIEW LET
TERS":PRINT@263,"B) QUIZ LOWERCA
SE":PRINT@327,"C) QUIZ UPPERCASE
"
90 PRINT@388,"<<<SELECT YOUR CHO
ICE>>>"
95 PRINT:PRINTSTRING$(32,"=");
100 X$=INKEY$:X=RND(-TIMER):IFX$
="A"THEN355ELSEIFX$="B"THEN105EL
SEIFX$="C"THEN645ELSE100
105 CLS0:PMODE0,1:PCLS1
110 LINE(0,0)-(254,170),PRESET,B
115 LINE(6,4)-(122,82),PRESET,BF
120 LINE(128,4)-(248,82),PRESET,
B
```


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```
125 LINE(6,86)-(122,164),PRESET,
B
130 LINE(128,86)-(248,164),PRESE
T,B
135 DRAW"BM26,188C0NU10R10NU10BR
6R10U6L10U4R10BR6NR10D4NR10D6R10
BR12BU6NE4D2F4BR6R10U6L10U4R10BR
6ND10R10D4NL10BR6NR10D6U10R10D10
BR6NR10U10R10BR6NR10D4NR10D6R10B
R10U10NL4R10D4NL10D6NL14BR6U10R1
0D4NL10D6BR6U10R10D4L10R4F6BR6E4
U2H4"
140 DATA130,6,246,80,6,86,120,16
2,130,86,246,162
145 PAINT(2,2),0,0:PCOPY1TO3
150 PMODE0,4:PCLS1
155 LINE(0,0)-(254,170),PRESET,B
F
160 LINE(8,6)-(120,80),PSET,BF
165 PCOPY4TO2:PMODE0,1:SCREEN1,1
170 DATA"BM2,8C1","BM130,8C0","B
M2,90C0","BM130,90C0","BM2,48C0"
,"BM130,48C0"
175 FORI=1TO26
180 A(I)=RND(26):IFN(A(I))=1THEN
180
185 N(A(I))=1:NEXTI:FORY=1TO26:C
OLOR1,0
190 FORI=2TO4
195 B(I)=RND(3)+1:IFN(B(I))=0THE
N195
200 N(B(I))=0:NEXTI:FORI=1TO4:N(
I)=1:NEXT
205 B=RND(26):IFB=A((Y))THEN205
210 C=RND(26):IFC=B OR C=A((Y))T
HEN210
215 DRAW A$(1):DRAWP$(A(Y),1)
220 DRAW A$(B(2)):DRAWP$(B,2):DR
AWP$(B,3)
225 DRAW A$(B(3)):DRAWP$(C,2):DR
AWP$(C,3)
230 DRAW A$(B(4)):DRAWP$(A(Y),2)
:DRAWP$(A(Y),3)
235 COLOR1,0
240 Z=0
245 PMODE0,4
250 DRAW A$(1)+"C0":DRAWP$(A(Y),
1)
255 DRAW A$(B(2))+"C1":DRAWP$(B,
2):DRAWP$(B,3)
260 DRAW A$(B(3))+"C1":DRAWP$(C,
2):DRAWP$(C,3)
265 DRAW A$(B(4))+"C1":DRAWP$(A(
Y),2):DRAWP$(A(Y),3)
270 PMODE0,1:SCREEN1,1
275 LINE(8,6)-(120,80),PSET,B
280 X$=INKEY$:IFX$=" "THEN290ELS
EIFX$="@"THEN655
285 COLOR1,0:LINE(8,6)-(120,80),
PRESET,B:GOTO275
290 Z=Z+1:IFZ=4THENZ=1
295 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PSET,B
300 X$=INKEY$:IFX$=" "THEN290ELS
EIFX$=CHR$(13)THEN310ELSEIFX$="@
"THEN655
305 COLOR1,0:LINE(C(Z),D(Z))-(E(
Z),F(Z)),PRESET,B:GOTO295
310 IFZ+1=B(4)THEN320
315 NW=NW+1:FORK=1TO5:PMODE0,4:S
CREEN1,1:SOUND10,3:PMODE0,1:SCRE
EN1,1:SOUND1,3:NEXTK:GOTO295
320 NC=NC+1:PMODE0,4:PCLS1:LINE(
0,40)-(256,126),PRESET,B:LINE(6,
44)-(124,122),PRESET,B:LINE(130,
44)-(248,122),PRESET,B:PAINT(2,4
2),0,0
325 DRAW A$(5):DRAWP$(A(Y),1)
330 DRAW A$(6):DRAWP$(A(Y),2):DR
AWP$(A(Y),3)
335 SCREEN1,1
340 X$=INKEY$:IFX$<>CHR$(13)THEN
340
345 PMODE0,1
350 PCOPY3TO1:SCREEN1,1:PCOPY2TO
4:NEXTY:GOTO655
355 PMODE0,2:PCLS1:SCREEN1,1:LIN
E(0,40)-(256,126),PRESET,B:LINE(
6,44)-(124,122),PRESET,B:LINE(13
0,44)-(248,122),PRESET,B:PAINT(2
,42),0,0
360 FORI=1TO26:DRAW A$(5):DRAWP$
(I,1)
365 DRAW A$(6):DRAWP$(I,2):DRAWP
$(I,3)
370 X$=INKEY$:IFX$<>CHR$(13)THEN
370
375 COLOR1,0:LINE(8,46)-(122,120
),PSET,BF:LINE(132,46)-(246,120)
,PSET,BF:NEXTI
380 RUN
385 DATA"BD54BR40M+20,-40R8M+20,
+40L10M-8,-16L12M-8,+16NL10BM+11
,-22UM+3,-6RM+3,+6DL6
390 DATA"BD54BR44R14E6D6R8U24L8D
6H6L14G6D12F6BE6R4E4U4H4L4G4D4F4
"
395 DATA"BD54BR44U6R4U28L4U6R34F
4D12G4F4D12G4NL34BH6NL16E2U4H4L1
4ND10BU8R14E4U4H2L16D10"
400 DATA"BD54BR42NU40R8U6F6R14E6
U12H6L14G6BD12F6BE6R4E4U4H4L4G4D
4NF4BL8BU8U22L6"
405 DATA"BD54BR48H6U28E6R28F6D6L
8H4L14G4D16F4R14E4R8D6G6L28"
410 DATA"BD54BR46H6U12E6R20F6D4L
8H2L10G2D4F2R20D8L24"
415 DATA"BD54BR44U6R4U28L4U6R34F
4D32G4NL34BH6NL16E2U24H2L16D26"
420 DATA"BD54BR44R14E6D6R8U40L8D
22H6L14G6D12F6BE6R4E4U4H4L4G4D4F
4"
425 DATA"BD54BR44U40R40D8L30D8R2
0D8L20D8R30D8L40"
430 DATA"BD54BR46H6U12E6R20F6D8L
20D2R20D8L24BU16BR4R10"
435 DATA"BD54BR44U40R40D8L30D8R2
0D8L20D16L10"
440 DATA"BD54BR48U14L8U8R8U14E4R
20D8L10G4D6R8D8L8D14L10"
445 DATA"BD54BR48H6U28E6R28F6D6L
8H4L14G4D16F4R14E4U2L10U8R18D16G
6L28"
450 DATA"BD54BR46NR16H6U12E6R20F
6D28G4L26U8R20U6BU8U8L12D8R12"
455 DATA"BD54BR44U40R8D16R20U16R
8D40L8U16L20D16L8"
460 DATA"BD54BR42U40R8D20E4R14F4
D20L8U12H4L4G4D12L8"
465 DATA"BD54BR54U6R6U28L6U6R20D
6L6D28R6D6L20"
470 DATA"BD54BR52U22R8D22L8BU26U
8R8D8L8"
475 DATA"BD54BR44H4U12R8D4F4R8E4
U22L12U6R34D6L12D28G6L22"
480 DATA"BD54BR52U22NR8BU4U8R8D8
NL8BD4D30G4L16H4U6R8F2R4E2"
485 DATA"BD54BR44U40R10D16E16R12
G20F20L12H16D16L10"
490 DATA"BD54BR42U40R8D22E10R10G
12F16L10H12L2D12L8"
495 DATA"BD54BR48U40R10D32R22D8L
30"
500 DATA"BD54BR52U34L8U6R16D40L8
"
505 DATA"BD54BR38U40R10F14E14R10
D40L10U28G14H14D28L10"
510 DATA"BD54BR34U24R4D4F4R12F4E
4R12F4D20L8U14H2L4G2D14L10U14H2L
4G2D14L10"
515 DATA"BD54BR42U40R16M+20,+30U
30R10D40L16M-20,-30D30L10"
520 DATA"BD54BR46U24R4D4E4R12F4D
20L8U14H2L4G2D14L8"
525 DATA"BD54BR48H6U28E6R30F6D6N
D14BL10H4L14G4D16F4R14E4NU14BR10
D6G6L30"
530 DATA"BD54BR46H6U12E6R24F6D4N
D8BL10H2L12G2D4F2R12E2U2BR10D6G6
L24"
535 DATA"BD54BR54U40R30F4D16G4L2
0D16NL10BU24U8R12F2D4G2L12"
540 DATA"BD68BR42U38R30F4D16G4L2
0D14NL10BU22U8R12F2D4G2L12"
545 DATA"BD54BR48H6U28F6R30F6D6N
D14BL10H4L14G4D16F4R8H6R6F6E4NU1
4BR10D6G6F6L6H6L24"
550 DATA"BD68BR78U8L4U30L30G4D16
F4R20D14NR12BU22U8L12G2D4F2R12"
555 DATA"BD54BR48U40R30F4D16G4BL
20D16NL10BU24U8R12F2D4G2L12BD8F1
6R12H16R6"
560 DATA"BD54BR46U24R4D4E4R18D8L
12G4D12L8"
565 DATA"BD54BR46U8R30U8L30U24R3
8D8L28D8R28D24L38"
570 DATA"BD54BR42U4R20U4L20U16R2
8D6L18D4R18D14L28"
575 DATA"BD54BR54U6R6U26L18U8R44
D8L18D26R6D6L20"
580 DATA"BD54BR52U16L8U8R8U8R8D8
R8D8L8D16F8L10H6U2"
585 DATA"BD54BR42U40R10D32R20U32
R10D40L40"
590 DATA"BD54BR44U22R8D16R8U16R8
D18F4L8H2G2L14"
595 DATA"BD54BR54M-20,-40R12M+16
,+32M+16,-32R12M-20,+40L14"
600 DATA"BD54BR52M-11,-22R8M+8,+
16M+8,-16R8M-11,+22L8"
605 DATA"BD54BR38M-10,-40R10M+8,
+32M+8,-32R16M+8,+32M+8,-32R10M-
10,+40L16M-8,-32M-8,+32L16"
610 DATA"BD54BR40M-11,-22R8M+8,+
16M+8,-16R8M+8,+16M+8,-16R8M-11,
+22L10M-8,-16M-8,+16L8"
615 DATA"BD54BR36E20H20R12F16E16
R12G20F20L12H16G16L12"
620 DATA"BD54BR40E12H10R8F6E6R8G
10F12L8H8G8L8"
625 DATA"BD54BR56U16M-14,-24R12M
+8,+14M+8,-14R12M-14,+24D16L12"
630 DATA"BD54BR46NR12H6U18R8D16R
12U16R8D34G4L26U8R20U6"
635 DATA"BD54BR44U8E24L24U8R36D8
G24R24D8L36"
640 DATA"BD54BR46U6E12L12U6R24D6
G12R12D6L24"
645 CLS0:FORI=1TO26:TEM$=P$(I,1)
:P$(I,1)=P$(I,2):P$(I,2)=TEM$:NE
XT
650 GOTO105
655 CLS:PRINT@101,"YOU TRIED"NC+
NW"TIMES &":PRINT@165,"ANSWERED"
NC"CORRECTLY"
660 PRINT@229,"WHILE DOING"NW"WR
ONG."
665 NQ=NC+NW:IF NQ=0THEN NQ=1
670 MS=INT(NC/NQ*100)
675 PRINT@293,"YOUR SCORE IS"MS"
%."
680 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
685 X$=INKEY$:IFX$="Y"THEN RUN
690 IFX$="N"THENCLS:END
695 IFX$="C"THEN270
700 GOTO685
```

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RAM Disk, Part III

by Tony DiStefano
Contributing Editor

In this, the final part of the RAM disk project, I cover the final steps before plugging it in — the testing of the RAM and software that makes a RAM disk in Radio Shack DOS. (Software for a RAM disk under OS-9 is available, but you must get it from CRC. The drivers are free, but there is a small shipping and handling charge. Just ask for the Super RAM disk OS-9 driver.)

Let's get to the *bits* of it. Before plugging the RAM disk into the Multi-Pak Interface, I suggest looking over your work. You need the diagram supplied in Part 2. Go over every wire one at a time, checking for shorts and cold solder joints. Now plug in all the chips except for the RAM chips and U17 and U18. Check for pins that are bent. Also check to make sure all the Pin 1s are in the right place. Insert a jumper from Pin 6 to Pin 7 in the socket where U17 should be. Remove all cartridges in the Multi-Pak and plug the RAM disk in Slot 1. Adjust the switch in the front of the Multi-Pak to Number 1. Turn the CoCo and the Multi-Pak on, then watch the screen and make sure the CoCo powers up properly. If it does, you are ready for Test 1.

You need a logic probe for this test. Type `POKE &HFF40,0` and press ENTER. This puts all 0s in Buffer U9. With the probe check that all the outputs are 0. Now type `POKE &HFF40,255` and press ENTER. This puts all 1s in Buffer U9. With the probe check that all outputs are 1, or give at least 2.4 volts on a volt meter. If all goes well, you can proceed to Test 2.

Turn the power off and change the jumper in U17 from Pin 6 to Pin 8. Repeat the above two pokes, this time using &HFF41 instead of &HFF40, and check the outputs of U10. Again turn the power off and remove the jumper. Repeat the above two pokes again, this time using &HFF42 instead of &HFF40, and check the outputs of U14. This tests to see if the latches are working. If not, check the circuit that involves U13, U16 and U17.

Moving on to Test 3, turn off the power and remove the RAM disk board. Insert U17 and U18. Plug the board in and check to see that there is a switching signal at Pin 1 of U10 and U11. This tells you if the refresh signal is working. If not, check the wiring to U10, U11, U16, U17 and U18.

Again turn off the power and remove the RAM disk board. This time insert the eight memory chips. Then plug in the board and make sure none of the memory chips become hot. If they do, turn the power off right away and check your circuit again. If all looks well and there is no smoke (just kidding), you are ready for Test 4. This is the big test. Start by typing in the following lines:

```
POKE &HFF40,0
POKE &HFF41,0
POKE &HFF42,0
POKE &HFF43,55
? PEEK(&HFF4)
```

Now for the 256,000 byte question. Did the computer print 55? If so, you are well on your way to a RAM disk. If not, it's back to the drawing board, so check all your work again very carefully.

The next step is to replace all the other cartridges in your system. Does it all still work? Good. Let's continue.

Test 5 is written by Steve Bjork and is a machine language program that I have transferred into a BASIC program. Listing 1, GENTEST, generates a machine language program called RDISKTST/BIN on disk. After running GENTEST, load in the program RDISKTST and execute it. It comes up with a menu that is easy to follow. You will know if you have problems, in which case it's back to the drawing board. If the test is successful, your project works and you are ready for the software program.

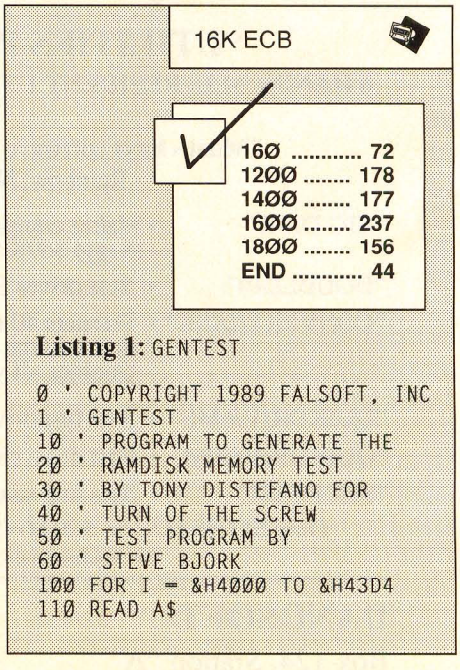
Listing 2 is for a program called *GENDRIVE*. Type it in and run it. It generates an ML program called DRIVER.BIN on disk. This is the RAM disk driver. To use it, type in this short program first:

```
10 CLEAR 200,&H7C00
20 LOADM "DRIVER" : POKE &HFF40,
0 : POKE &H985,1
30 EXEC
```

Then follow the instructions that appear on the screen. This program was written for my Disto 512K RAM disk and allows for two RAM drives, but only one is used in this project because you do not have enough memory for two. Also ignore the printer spooler for the same reason. Now, sit back and watch your disk accesses fly.

By the time you read this, *The Complete 'Turn of the Screw' Collection* book will be ready. I hope you will enjoy this collection of my past works and also that you will find it to be a handy addition to your CoCo library. ❑

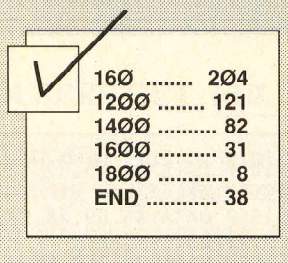
Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.



Listing 1: GENTEST

```
0 ' COPYRIGHT 1989 FALSOFT, INC
1 ' GENTEST
10 ' PROGRAM TO GENERATE THE
20 ' RAMDISK MEMORY TEST
30 ' BY TONY DISTEFANO FOR
40 ' TURN OF THE SCREW
50 ' TEST PROGRAM BY
60 ' STEVE BJORK
100 FOR I = &H4000 TO &H43D4
110 READ A$
```

```
120 X = VAL("&H"+A$)
130 POKE I,X
140 NEXT I
150 SAVEM"RDISKTST/BIN",&H4000,&
H43D4,&H4000
160 END
1000 DATA 20,33,50,50,40,50,40,5
0,40,40
1010 DATA 40,50,50,50,50,50,50,5
0,50,50
1020 DATA 40,50,40,50,50,50,50,5
0,50,50
1030 DATA 50,50,50,50,50,50,50,5
0,50,50
1040 DATA 50,27,10,3,E8,0,64,0,A
,0
1050 DATA 1,0,0,10,FF,40,7,17,3,
31
1060 DATA C,4D,45,4D,4F,52,59,20
,54,45
1070 DATA 53,54,20,46,4F,52,20,5
4,48,45
1080 DATA 20,44,49,53,54,4F,20,5
3,55,50
1090 DATA 45,52,D,52,41,4D,44,49
,53,4B
1100 DATA 20,46,4F,52,20,54,48,4
5,20,43
1110 DATA 4F,4C,4F,52,20,43,4F,4
D,50,55
1120 DATA 54,45,52,2E,D,50,52,4F
,47,52
1130 DATA 41,4D,20,42,59,20,53,5
4,45,56
1140 DATA 45,20,42,4A,4F,52,4B,2
E,D,43
1150 DATA 4F,50,59,52,49,47,48,5
4,20,31
1160 DATA 39,38,36,20,42,59,20,5
3,52,42
1170 DATA 20,53,4F,46,54,57,41,5
2,45,2E
1180 DATA D,50,4C,41,43,45,44,20
,49,4E
1190 DATA 20,50,55,42,4C,49,43,2
0,44,4F
1200 DATA 4D,41,49,4E,20,42,59,2
0,53,52
1210 DATA 42,2E,D,D,49,4E,20,57,
48,41
1220 DATA 54,20,53,4C,4F,54,20,4
9,53,20
1230 DATA 54,48,45,20,52,41,4D,2
0,43,41
1240 DATA 52,44,20,49,4E,D,28,31
,2C,32
1250 DATA 2C,33,20,4F,52,20,3C,4
2,52,45
1260 DATA 41,4B,3E,20,54,4F,20,4
5,58,49
1270 DATA 54,29,3F,20,0,C6,3,17,
2,37
1280 DATA 1A,50,8A,30,B7,FF,7F,4
F,B7,FF
1290 DATA 41,B7,FF,40,B7,40,4,B7
,FF,42
1300 DATA F6,FF,43,53,F7,FF,43,F
1,FF,43
1310 DATA 26,7,8B,4,81,10,23,E8,
4F,4D
1320 DATA 26,53,17,2,28,D,D,49,2
0,44
1330 DATA 4F,4E,27,54,20,53,45,4
5,20,41
1340 DATA 20,44,49,53,54,4F,20,5
2,41,4D
1350 DATA 20,44,49,53,4B,20,49,4
E,D,54
1360 DATA 48,41,54,20,53,4C,4F,5
4,2E,20
1370 DATA 50,52,45,53,53,20,41,4
E,59,20
1380 DATA 4B,45,59,20,54,4F,20,5
4,52,59
1390 DATA D,41,47,41,49,4E,21,D,
0,17
1400 DATA 1,B7,16,FE,A4,7F,40,3,
7F,40
1410 DATA 2,7F,40,5,30,8D,FE,67,
C6,20
1420 DATA 6F,80,5A,26,FB,17,1,C1
,C,54
1430 DATA 45,53,54,49,4E,47,20,4
1,0,B6
1440 DATA 40,4,C6,40,3D,17,1,D2,
17,1
1450 DATA AA,4B,20,52,41,4D,20,4
3,41,52
1460 DATA 44,D,0,17,0,DE,30,8D,F
E,33
1470 DATA C6,10,6F,80,5A,26,FB,8
E,0,0
1480 DATA B6,40,2,5F,1E,1,B7,FF,
42,F7
1490 DATA FF,41,1E,1,F7,FF,40,B7
,FF,43
1500 DATA 8B,17,5C,26,F5,34,2,17
,1,47
1510 DATA 81,3,10,27,0,A0,35,2,3
0,1
1520 DATA BC,40,4,25,D6,8E,0,0,B
6,40
1530 DATA 2,5F,1E,1,B7,FF,42,F7,
FF,41
1540 DATA 1E,1,F7,FF,40,B1,FF,43
,27,28
1550 DATA 34,16,B8,FF,43,31,8D,F
D,DA,44
1560 DATA 24,12,AE,A4,30,1,27,C,
AF,A4
1570 DATA AE,A8,10,30,1,27,3,AF,
A8,10
1580 DATA 31,22,4D,26,E6,17,0,64
,35,16
1590 DATA 8B,17,5C,26,CB,34,2,17
,0,ED
1600 DATA 81,3,27,48,35,2,30,1,B
C,40
1610 DATA 4,25,AE,B6,40,2,8B,55,
B7,40
1620 DATA 2,7C,40,3,10,26,FF,5B,
17,0
1630 DATA F6,D,41,4C,4C,20,50,41
,53,53
1640 DATA 45,53,20,44,4F,4E,45,2
1,D,50
1650 DATA 52,45,53,53,20,41,4E,5
9,20,4B
1660 DATA 45,59,20,54,4F,20,45,5
8,49,54
1670 DATA 2E,D,0,17,0,A5,10,FE,4
0,7
1680 DATA 86,33,B7,FF,7F,1C,EF,3
9,CC,4
1690 DATA 20,DD,88,17,0,B5,57,4F
,52,4B
1700 DATA 49,4E,47,20,50,41,53,5
3,20,4E
1710 DATA 55,4D,42,45,52,0,F6,40
,3,4F
1720 DATA 17,0,BF,17,0,97,D,D,42
,49
1730 DATA 54,20,20,20,45,52,52,4
F,52,53
1740 DATA 20,54,4F,54,41,4C,D,0,
4F,30
1750 DATA 8D,FD,18,34,12,86,20,1
7,0,71
1760 DATA A6,E4,8B,30,17,0,6A,17
,0,6B
1770 DATA 20,20,20,20,0,EC,84,17
,0,86
1780 DATA 86,20,17,0,58,17,0,55,
EC,88
1790 DATA 10,17,0,78,86,D,17,0,4
A,35
1800 DATA 12,30,2,4C,81,8,25,C9,
17,0
1810 DATA 42,D,28,55,53,45,20,42
,52,45
1820 DATA 41,4B,20,4B,45,59,20,5
4,4F,20
1830 DATA 45,58,49,54,29,D,0,6E,
9F,A0
1840 DATA 0,8D,FA,4D,27,FB,39,8D
,F8,81
1850 DATA 3,10,27,FF,4D,80,31,25
,F4,34
1860 DATA 4,A1,E0,24,EE,34,2,8B,
30,8D
1870 DATA 2,35,82,6E,9F,A0,2,35,
20,A6
1880 DATA A0,26,2,6E,A4,81,C,26,
15,34
1890 DATA 14,8E,4,0,9F,88,CC,60,
60,ED
1900 DATA 81,8C,6,0,25,F9,35,14,
20,E1
1910 DATA 8D,D9,20,DD,34,6,EC,E1
,26,9
1920 DATA 8D,D3,20,20,20,20,30,0
,39,34
1930 DATA 30,7F,40,6,31,8D,FC,7F
,8E,FF
1940 DATA FF,30,1,A3,A4,24,FA,E3
,A4,1E
1950 DATA 10,1F,98,FA,40,6,27,9,
8B,30
1960 DATA B7,40,6,8D,A4,20,4,86,
20,8D
1970 DATA 9E,1E,1,31,22,AE,A4,26
,D7,35
1980 DATA B0,FF,FF,FF,FF,FF,FF,F
F,FF,FF
```



```
160 ..... 204
1200 ..... 121
1400 ..... 82
1600 ..... 31
1800 ..... 8
END ..... 38
```

Listing 2: GENDRIVE

```
0 ' COPYRIGHT 1989 FALSOFT, INC
1 ' GENDRIVE
10 ' PROGRAM TO GENERATE THE
20 ' RAMDISK DRIVER
30 ' BY TONY DISTEFANO FOR
40 ' TURN OF THE SCREW
50 ' DRIVER PROGRAM BY
60 ' DANIEL CHOUINARD
90 CLEAR 200,&H7C00
100 FOR I = &H7C01 TO &H7FA6
110 READ A$
120 X = VAL("&H"+A$)
130 POKE I,X
140 NEXT I
150 SAVEM"DRIVER/BIN",&H7C01,&H7
FA6,&H7D44
160 END
1000 DATA 35,31,32,4B,20,44,49,5
3,54,4F
1010 DATA 20,52,41,4D,43,41,52,4
4,20,44
1020 DATA 52,49,56,45,52,D,28,43
,29,31
1030 DATA 39,38,37,20,42,59,20,4
4,41,4E
1040 DATA 49,45,4C,20,43,48,4F,5
5,49,4E
1050 DATA 41,52,44,D,D,4D,55,4C,
54,49
1060 DATA 2D,50,41,4B,20,53,4C,4
F,54,3F
1070 DATA 20,3E,0,D,D,49,4E,53,5
4,41
1080 DATA 4C,4C,49,4E,47,20,52,4
1,4D,44
1090 DATA 49,53,4B,53,3A,D,45,4E
,54,45
1100 DATA 52,20,44,52,49,56,45,2
0,4E,55
1110 DATA 4D,42,45,52,53,20,30,2
D,33,20
1120 DATA 4F,52,D,48,49,54,20,5B
,45,4E
1130 DATA 54,45,52,5D,20,57,48,4
5,4E,20
1140 DATA 46,49,4E,49,53,48,45,4
4,2E,D
1150 DATA 0,D,44,52,49,56,45,3F,
0,D
1160 DATA D,49,4E,49,54,3F,0,D,D
,49
1170 DATA 4E,53,54,41,4C,4C,20,5
0,52,49
1180 DATA 4E,54,45,52,20,53,50,4
F,4F,4C
1190 DATA 45,52,3F,0,D,D,4F,55,5
4,50
1200 DATA 55,54,20,4F,4E,20,44,4
9,53,54
1210 DATA 4F,20,50,50,52,49,4E,5
4,3F,0
1220 DATA D,D,50,52,49,4F,52,49,
54,59
1230 DATA 20,54,4F,20,50,52,49,4
E,54,45
1240 DATA 52,20,28,31,2D,39,29,2
0,3E,0
1250 DATA D,D,36,34,4B,20,50,52,
49,4E
1260 DATA 54,45,52,20,53,50,4F,4
F,4C,45
1270 DATA 52,20,49,4E,53,54,41,4
C,4C,45
1280 DATA 44,2E,D,D,0,0,0,0,FF,F
F
1290 DATA 0,1,0,0,0,0,0,12,B7,FF
1300 DATA DF,7E,FF,FF,AD,9F,A0,0
,81,59
1310 DATA 27,4,81,4E,26,F4,AD,9F
,A0,2
1320 DATA 81,59,39,7F,80,0,8E,0,
0,BF
1330 DATA 7D,26,BF,7D,28,7D,80,0
,27,14
1340 DATA 1A,50,8E,80,0,B7,FF,DE
,EC,84
1350 DATA B7,FF,DF,ED,81,8C,FF,0
,25,F1
1360 DATA 86,45,B7,80,0,9E,72,BF
,7D,2F
1370 DATA 8E,7D,2A,9F,72,8E,7C,0
,BD,B9
1380 DATA 9C,AD,9F,A0,0,81,31,25
,F8,81
1390 DATA 34,22,F4,AD,9F,A0,2,80
,31,8B
1400 DATA 30,B7,7D,20,86,FF,B7,7
D,21,B7
1410 DATA 7D,22,8E,7C,49,BD,B9,9
C,8E,7C
1420 DATA 97,BD,B9,9C,AD,9F,A0,0
,81,D
1430 DATA 27,20,81,30,25,F4,81,3
3,22,F0
1440 DATA AD,9F,A0,2,80,30,B1,7D
,21,27
1450 DATA DF,7D,7D,21,2A,5,B7,7D
,21,20
1460 DATA D5,B7,7D,22,B6,7D,21,B
B,7D,22
1470 DATA 81,FE,27,41,BE,C0,4,A6
,84,81
1480 DATA 7E,26,5,EC,1,FD,7D,1E,
86,7E
1490 DATA A7,84,CC,7F,22,ED,1,8E
,7C,9F
1500 DATA BD,B9,9C,BD,7D,31,26,1
F,1A,50
1510 DATA CE,FF,40,B6,7D,20,B7,F
F,7F,86
1520 DATA FF,8E,0,0,C6,6,E7,42,A
F,C4
1530 DATA A7,43,30,1,26,F8,5A,2A
,F3,86
1540 DATA 33,B7,FF,7F,8E,7C,A7,B
D,B9,9C
1550 DATA BD,7D,31,27,1,39,8E,7C
,C2,BD
1560 DATA B9,9C,7F,7D,23,BD,7D,3
1,26,3
1570 DATA 73,7D,23,8E,7C,DC,BD,B
9,9C,AD
1580 DATA 9F,A0,0,81,31,25,F8,81
,39,22
1590 DATA F4,AD,9F,A0,2,80,30,B7
,7D,24
1600 DATA 8E,7C,FA,BD,B9,9C,86,7
E,B7,A2
1610 DATA BF,8E,7E,77,BF,A2,C0,B
E,1,D
1620 DATA BF,7E,C7,8E,7E,AE,BF,1
,D,39
1630 DATA 34,17,BE,7D,26,30,1,BC
,7D,28
1640 DATA 27,FB,1A,50,BF,7D,26,F
6,7D,20
1650 DATA F7,FF,7F,C6,7,F7,FF,42
,BF,FF
1660 DATA 40,B7,FF,43,C6,33,F7,F
F,7F,81
1670 DATA D,27,8,C,9C,D6,9C,D1,9
B,25
1680 DATA 2,F,9C,35,97,B6,7D,24,
B7,7D
1690 DATA 25,7D,7D,23,27,7,B6,FF
,53,2A
1700 DATA B,20,6,F6,FF,22,54,24,
3,7E
1710 DATA FF,FF,BE,7D,28,BC,7D,2
6,27,F5
1720 DATA 30,1,BF,7D,28,B6,7D,20
,B7,FF
1730 DATA 7F,BF,FF,40,86,7,B7,FF
,42,B6
1740 DATA FF,43,C6,33,F7,FF,7F,7
D,7D,23
1750 DATA 27,8,B7,FF,52,B7,FF,53
,20,18
1760 DATA 8D,1B,5F,8D,1A,C6,8,C6
,8,34
1770 DATA 4,5F,44,59,58,8D,E,35,
4,5A
1780 DATA 26,F3,8D,5,7A,7D,25,26
,9E,C6
1790 DATA 2,F7,FF,20,8D,0,9E,95,
7E,A7
1800 DATA D3,34,76,D6,EB,F1,7D,2
1,27,17
1810 DATA F1,7D,22,27,12,7D,7D,1
E,27,6
1820 DATA 35,76,6E,9F,7D,1E,86,5
,BE,C0
1830 DATA 4,6E,4,F,F0,96,EC,C6,1
2,3D
1840 DATA DB,ED,89,0,83,0,1,34,6
,96
1850 DATA EB,B1,7D,21,27,7,CC,2,
D0,E3
1860 DATA E1,20,2,35,6,34,6,1A,5
0,B6
1870 DATA 7D,20,B7,FF,7F,35,6,B7
,FF,42
1880 DATA F7,FF,41,5F,CE,FF,43,1
0,8E,FF
1890 DATA 40,9E,EE,96,EA,81,2,27
,D,81
1900 DATA 3,27,14,86,33,B7,FF,7F
,1C,AF
1910 DATA 35,F6,E7,A4,A6,C4,A7,8
0,5C,26
1920 DATA F7,20,EC,E7,A4,A6,80,A
7,C4,5C
1930 DATA 26,F7,20,E1,0,0,0,0,0,
0
```

Get out your toolbox and saw

Custom Built for the CoCo

by Benjamin W. Brunotte

Weathering a cold winter can be difficult even for the best of us. Of course, as computer enthusiasts, we do have options to help thwart cabin fever. Still, why not use the time constructively? This article provides instructions for building a custom computer desk and hutch. Let's get right down to it.

I selected 3/4-inch birch veneer plywood when I built my desk. The birch veneer is attractive and easily finished with stain. Also, the screws can get a better bite in the plywood edge than in a particle board edge. Finally, the 3/4-inch thickness allows you to build the desk as a stand-alone piece without any bracing or additional construction.

Other materials to consider are 3/4-inch birch veneer with a particle board core, 3/4-inch particle board or 3/4-inch wafer board. The plain particle board and wafer board need to be painted or covered with formica to get a finished appearance.

Select the wood by hand to get the best quality possible; otherwise the loaders grab the first piece from the top. You receive more help at a do-it-yourself store but prices are often higher.

Ben Brunotte lives in Nederland, Texas, and works in operations at a large oil refinery. He is a self-taught programmer, and the CoCo is his hobby. He can be contacted at 3221 N. Twin City Hwy., #6, Nederland, TX 77627.

Be careful while building the desk to make sure the veneer side faces out so it can be seen instead of the plywood back. As a general rule, always apply glue to pieces before joining with screws. This helps strengthen the joints. Wipe off any excess glue before it dries.

Cutting

The cutting guide (Figure 1) illustrates how each piece should be cut from the two sheets of 4'-by-8' birch veneer plywood. Make sure the veneer side is facing the saw and use a fine-toothed saw blade to get smoother cuts. The quality of the final product depends on your keeping all cuts straight so use a saw guide if possible. It is also very important that all corners are

Quantity	Item
2	3/4" x 4' x 8' birch veneer plywood
1	1/4" x 4' x 8' tempered hardboard
1	2" x 2" x 8'
60 feet	1/4" x 3/4" screen molding
1 box	100 - Number 8 x 1" flathead wood screws
1 box	3/4" brads
2 qts.	wood stain
2 qts.	urethane satin finish

You will also need wood glue, Plastic Wood, and plenty of fine grit sandpaper and 00 steel wool.

Table 2: Materials List

A	Right side	E	Drawer sides	I	Side shelves
B	Left side	F	Desktop	J	Vertical supports
C	Monitor shelf	G	Top		
D	Drawer bottoms	H	Top center shelf		

Table 1: Key to the Cutting Guide

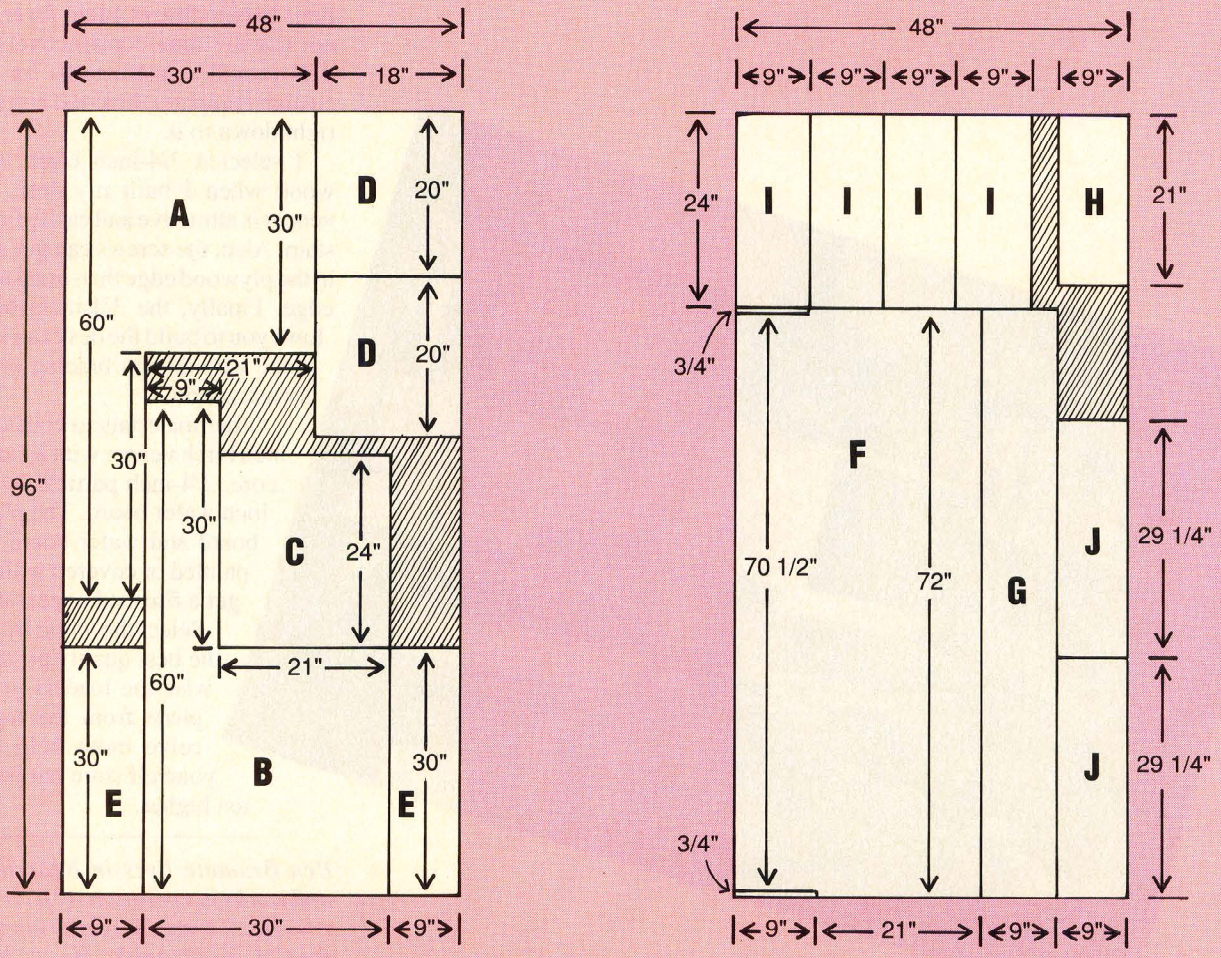


Figure 1: Plywood Cutting Guide

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DYNASPELL 102K WORD SPELLING CHECKER NOW AVAILABLE!

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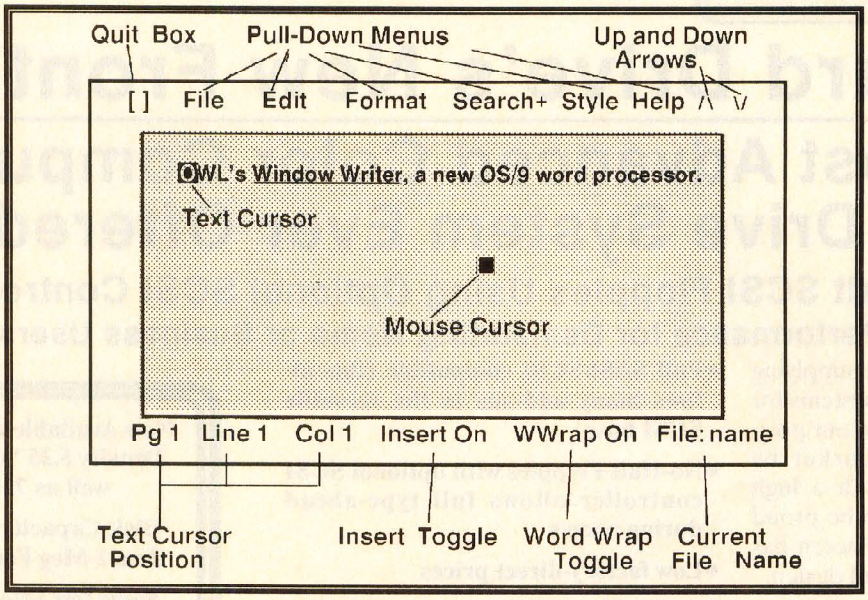
Window Writer is the first Color Computer word processor which takes full advantage of OS/9. The result is a word processor which is fully as modern and professional in action as those previously available only for the IBM and Mac. The operating system allows true multi-tasking with other programs or itself. Not limited to just printing one file and editing another. You can print one file in one window while you edit files in other windows. At the same time you can be running a small program in another window. You can cut and paste between sections of files in different windows.


Quit Box
Pull-Down Menus
Up and Down Arrows
[] File Edit Format Search+ Style Help /\ \/
OWL's Window Writer, a new OS/9 word processor.
Text Cursor
Mouse Cursor
Pg 1 Line 1 Col 1 Insert On WWrap On File: name
Text Cursor Position
Insert Toggle
Word Wrap Toggle
Current File Name

Pull Down Menus and Help Screens

A full selection of pull down menus and detailed help screens make learning easy and are only a key stroke (or mouse click) away. All menus and help screens can be user configured for everything including menu colors and contents. You don't like the color of a menu? You think one help item should be listed differently? Change them!

The menus and help screens can be reached by cursor keys or the mouse (or joystick) or can be accessed by control keys.

Hi-Res Display

Window Writer uses an **80-column monitor display** screen for clarity. As shown in the above screen drawing, you can quickly see how to access the menus and help screens. You can determine the current position by page, line number, and column. The mouse can use this section to quickly change to a specific page or line in the file. The text insert and word wrap toggles also are indicated and changeable with the mouse button.

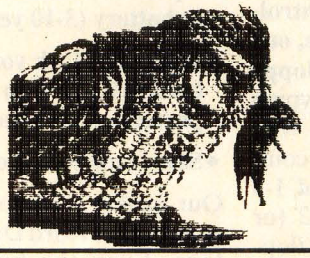
Ram Disk

A RAM disk is set up in **Window Writer** to make full use of all or a user specified portion of the memory on the 512K CoCo 3. On the 128K CoCo a smaller RAM disk is set up to still allow use of all available memory for file editing. For use of all features, a 512K machine is required.

The RAM disk is used for storage of the file(s) being edited, for the clipboard for cut and paste, and as a print spooler for the file being printed. **Window Writer's** clipboard can be saved to disk or pasted into any file being edited because files use the same clipboard memory. The RAM disk also can be used with other OS/9 programs.

Mail-Merge

With **Window Writer** you can create form letters and send them out to a list of addresses in an address file. First names or other information can be added to "personalize" these letters.



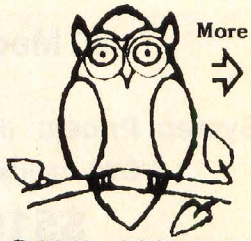
French Version:

An abridged French translation of the **Window Writer** manual is now available. This manual is written by a Canadian CoCo user and will aid French speaking users. **Only $7.50 additional.**

Editing is a snap with OWL's Efficient Mouse Usage!

Editing

Like most modern word processors, with **Window Writer** there is always more than one way to access any editing feature. You can access editing by menus using mouse, "keyboard mouse", or through control keys. Full help screens are quickly available for all editing features. A help screen can be left visible while needed and then quickly removed to get back to full screen editing.



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square. This is probably most difficult while cutting the sheet of tempered hardboard used for the back of the desk.

Remember, once you've cut a piece of wood, nothing short of a miracle can undo that cut. When doing carpentry work, I follow the motto "Measure twice before cutting once."

Leave the 21-inch cuts for the monitor shelf (C) and the top-center shelf (H) until you are assembling the desk. Then you can measure and cut the pieces to the exact size to fit the space when assembling.

Cut a 30-and-3/4-by-72-inch piece from the ¼-inch, 4'-by-8' sheet of tempered hardboard. This will be the back of the desk. Cut two 30-inch lengths from the 2-inch-by-2-inch-by-8-foot board for legs to support the center of the desk.

Assembly

Attach the top (G) to the right side (A) and the left side (B), making sure the top piece goes across the top end of each side. Drill and countersink three screws through the top into the top edge of each side. Position the desktop (F) so that the sides fit into the 9-inch cut-outs and the desktop overlaps the 21-inch edge of each side. Drill and countersink three screws through the sides into the desktop edge. Drill and countersink three screws through the desktop into the 21-inch edge of each side.

Square the assembled framework and nail or screw the tempered hardboard to the back of the desk. The back of the shelves will be left open.

Lay the unit on its back and position the drawer sides (E) and bottoms (D). Attach the drawer sides as before, using four countersunk screws placed through the desktop. Drill and countersink three screws through the drawer bottoms into the bottom edges of the drawer sides. Bring the desk upright, level the drawer bottoms, and attach them to the left and right end pieces in a similar manner.

Put the two 30-inch supports in place with the top end flush to the bottom of the desktop and a side against a drawer side, and fasten them in place with countersunk screws.

Position the vertical supports (J) and the side shelves (I). Measure from the bottom edge of the piece above to the top edge of the shelf. This ensures that the space between shelves is 11½ inches so that magazines, books, etc., will fit easily. Drill and

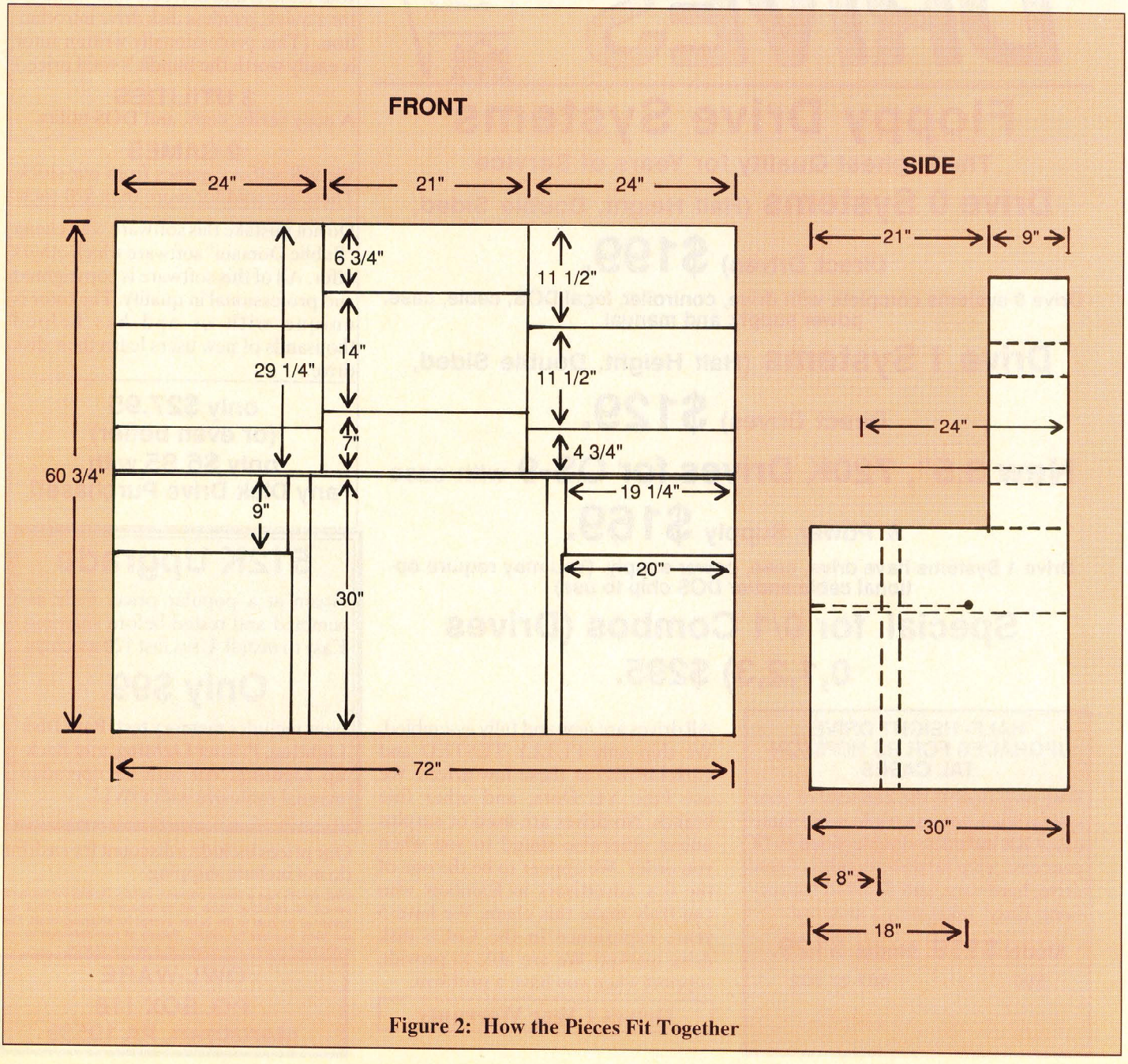

Figure 2: How the Pieces Fit Together

countersink three screws into the shelf edges through the right and left sides. Fit the vertical supports flush against the inside shelf edges and make sure everything is square. Drill and countersink three screws into the vertical support edges through the top and also the desktop. After checking the position of each free shelf edge with a level, drill and countersink three screws through the vertical supports into the shelf edges.

Measure and cut the monitor shelf (C) and the top center shelf (H) to fit the space between the vertical supports. Position the monitor shelf and the top center shelf, and drill and countersink three screws through the vertical supports into the top center shelf edges. Attach the monitor shelf in a similar fashion.

The Finishing Touches

Cut the screen molding to length and nail it in place with 3/4-inch brads to cover the plywood edges. I covered all the horizontal edges first and then the vertical edges. Sixty feet of screen molding should be enough, even allowing for some waste.

Cover all nail and screw heads with Plastic Wood. Sand the entire desk smooth after the Plastic Wood is dry, making sure to sand with the grain of the wood. As a final step before applying the stain, go back over the desk with 00 steel wool. Remove all sanding dust before staining. Apply your choice of stain according to the directions on the can. After the stain is dry, use the 00 steel wool again to smooth any grain that may have been raised by the stain. Apply the urethane finish according to the directions on the can.

When the finish has dried, position the desk with the computer and equipment on it. Cut holes as necessary for electric cords, wires, cables, etc. I cut a hole in the hardboard back for a four-plug extension under the desk and cut another hole so the electric cords can reach the extension. I plugged the monitor into the wall receptacle and plugged everything else into the extension. I cut a slot in the hardboard for the paper to the printer. Then I put the box of paper on the floor and ran the paper through the slot and under the bottom shelf to the printer.

I have a 13-inch monitor on the monitor shelf. My CoCo is on the desk directly under the monitor, and my DMP-110 printer is on the right side of the desk. The modem is on the left side underneath the shelf, and the two disk drives are in the right desk drawer. I have plenty of shelf space for RAINBOW magazines, disk boxes, books, instruction manuals, etc.

Making Changes

I built this custom computer desk to fit a specific spot in a room. Since the desk is 30 inches deep and the door to the room is only 26 inches wide, the desk will never leave that room in one piece. Other people may need to change the dimensions to meet their own needs. The five-foot height should not cause any problems because most doors are at least six feet tall. To build a narrower desk, the 30-inch dimension for the right side (A), the left side (B), the desk top (F), and the drawer sides (E) would need to be changed to the smaller measurement. Also the monitor shelf C) would have to be shortened from 24 inches or it would stick out too far. To build a shorter desk, the 72-inch dimension for the desk top (F), the top (G), and the tempered hardboard back would need to be changed to the smaller measurement. The side shelves would have to be shortened too. The monitor shelf should remain 21 inches wide.

To buy a computer desk, hutch and printer stand at a store would cost about $200. This desk gives you more work area and shelf space for less money. You can also finish this desk to match your existing furniture. And the sense of accomplishment gained goes a long way in helping you avoid those cabin-fever blues.

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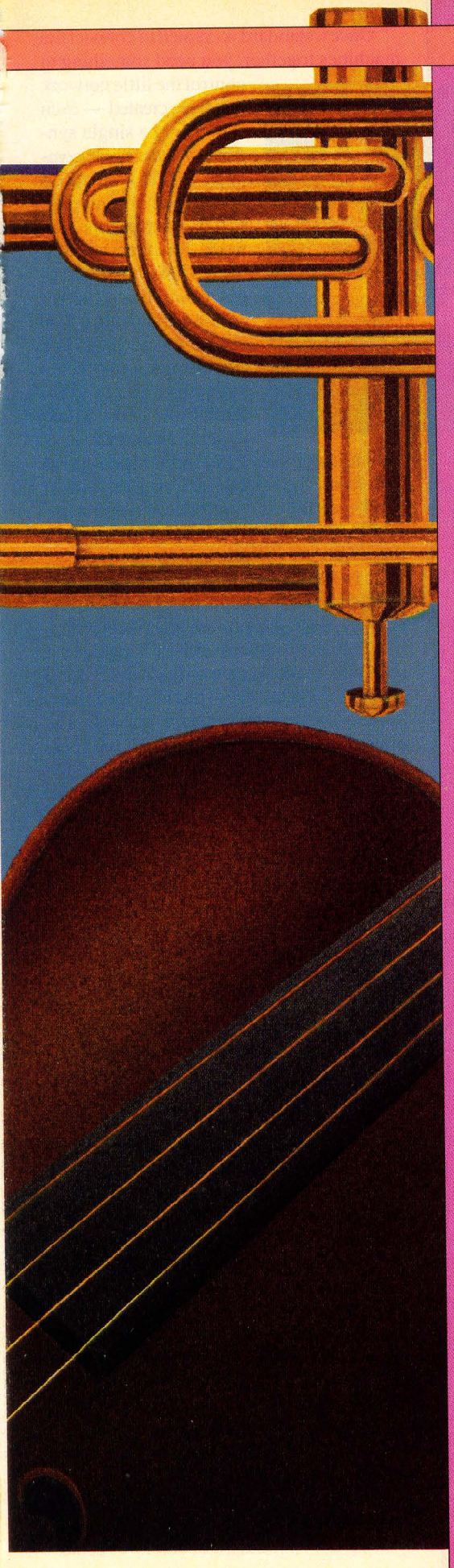


Creating a musically-inclined CoCo with MIDI

Play It Again, CoCo

by Jeffrey S. Parker

It is early in the morning. A gray dawn is just beginning to paint the horizon, lazily chasing after night. You close the door behind you with a creak and metallic ka-chunk and flick on the lights. The fluorescent lights buzz and flutter as you walk around synthesizers and consoles, trying not to stumble over the cables. You sip your coffee and in spite of your best efforts not to wake up, you hear snatches of rhythms and melodies starting to rouse you. A flip of the switch and the computer whinies to life. Another click brings up the Korg, Kurzweil and Casio. Now the Yamaha and the Roland (no need for the others yet). You toss a copy of *Music & Computers* on the table and throw a copy of THE RAINBOW that someone left on the drum machine on top of it. It's time to make music.

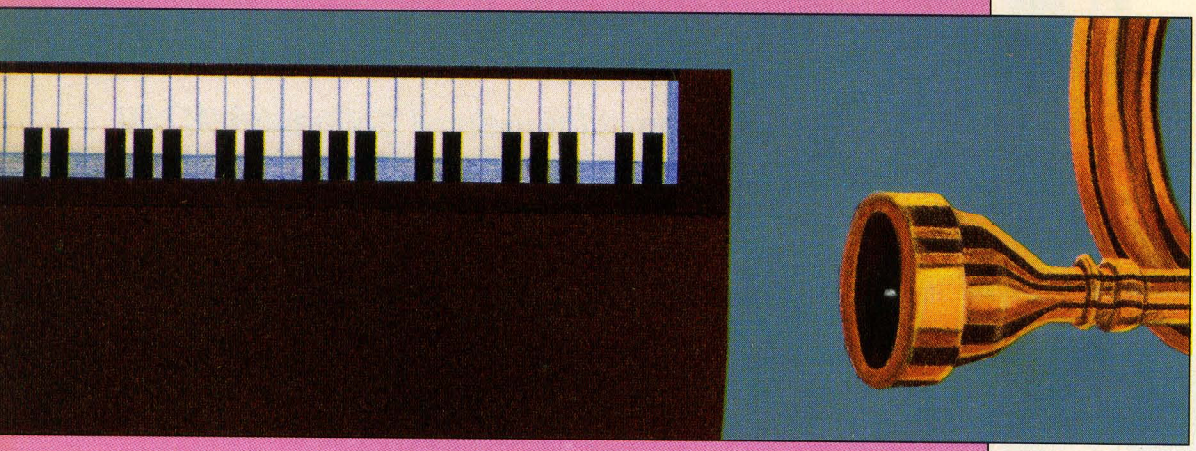
Let's see, how about a 16-voice rendition of Mozart? A little night music? Sure, that sounds good. The hard-drive light blinks furiously for a few seconds, then the monitor fills with the main screen, showing you the title of the piece, the instruments selected, the score, and the onscreen slide switches and push-buttons that control all the synths on the network.

The room swells as the crescendos build, and the voices of all those mighty digital MIDI synthesizers throatily announce the dawn. Turning the volume down a little, you sit back to enjoy the music. Outside you hear a car pull up. A few minutes later the studio door swings open, revealing a bleary-eyed musician, not quite ready for another day's work.

What Is MIDI All About?

MIDI stands for Musical Instrument Digital Interface. It is the standard means by which digital musical instruments communicate with one another. It is also the means by which a computer such as the CoCo can control one musical synthesizer or many at the same time. Pared down to its bare essentials, MIDI is a communications protocol or language designed to let numerous musical instruments interface with each other. The idea here is that if one instrument can make good music, two or more can make great music. Until only a few years ago no simple means existed that allowed different electronic instruments to work together. MIDI answers the problems of connecting different instruments from different manufacturers together. For example, using simple, inexpensive cables you can connect Roland, Yamaha and Casio MIDI synths together and direct each to perform different functions for the music you want to create, record or playback. Amazing, isn't it? Talk about apples and oranges!

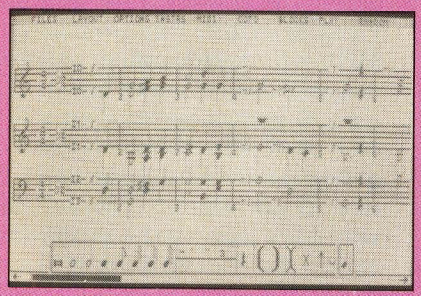
Jeffrey S. Parker has been involved with computers since 1976 and CoCos since 1981. He is the Director of Computer Education at The Parker Academy in Sudbury, Massachusetts. He is also a lecturer at Northeastern University in technical communications. A noted freelance writer and editor, Mr. Parker is a certified computer professional and is a graduate of the University of Massachusetts in Amherst.



The Brains Behind Rulaford and Lyra

Cecil Houk has been involved with radios and electronics for about 34 years. At the age of 16 he obtained a novice-class amateur radio operator's liscense and soon followed with a general-class license.

Following high school Cecil joined the Navy and served as an electronics technician while earning his amateur extra-class radio license. After 20 years Cecil left the Navy and began tinkering with computers. In 1982 he bought his first 16K Standard BASIC CoCo for $399. On the same day he bought a music ROM cartridge and outgrew it about a week later. He toyed with the CoCo for a year, bought a DMP-100, and in February of 1983 discovered THE RAINBOW.



After buying his first MIDI synthesizer (a Yamaha DX-100) in 1986, Cecil started working on the *Lyra Lybrary*.

About two years later he had acquired four more synthesizers and had the *Lyra Lybrary* up to 12 disks. By this time Speech Systems had left the CoCo Community, and only a few months later Cecil started up Rulaford Research. Since then Cecil has brought the *Lyra Lybrary* up to 18 disks and 376 titles.

Meet the Author

Dr. Lester Hands has been fascinated with electronic gadgets since he was a young boy. After he finished college, Les went to medical school and bought his first computer called the Cosmic Elf. Eight years later, when the Color Computer was introduced, he bought one for $399. It had 4K of RAM and color. Soon after he found a music program to play on his Kim I with the CoCo and its 6809 chip. He realized he had a better thing going than the 6502. In 1982 he wrote *Musica I*.

Later Lester encountered a music program on the Commodore Amiga and became fascinated by the concept of a mouse-driven music program. By then Cecil had the MIDI bug and was passing it on to Lester. According to Lester that Amiga program was the real inspirational seed for *Lyra*.

According to Dr. Hands, CompuServe played a key role in the development of the CoCo MIDI program. He needed someone to bounce ideas off and to do some testing for him — that person was Mike Ward (*MikeyTerm*). It was not until January of this year that *CoCo MIDI 3* came to be.

Once a standard is created to connect the machines together, you need something to control the little network you have created — even if it is only a single synthesizer and a single computer. MIDI systems do not require a computer. MIDI instruments can work together without them. However, the computer simplifies the recording and playback of digital music data. For our purposes, the computer plays a key and essential role in the whole picture. Naturally it is used as a controller to send information to and from the MIDI instruments and to handle all the signal processing and communicating needed to conduct business. In this context it means making music.

It is far easier for the electronic members of a band (the keyboards) to talk to one another than the human members. With MIDI as the standard and the language, it then falls to the computer to do everything else — the synthesizers just play the music. Synthesizers neither create nor edit the music scores. The computer itself is important: the speed, the RAM memory and the amount of storage on disk drives. Whether the MIDI port is added on to the computer or is built in, all of these elements are factors. Software is equally important. It must control a multitude of functions and still be flexible and easy-to-use.

Until recently the Color Computer has not really had a role to play in the MIDI universe. Other machines like the Macintosh, MS-DOS machines and the Atari ST have taken center stage. Now software, hardware and other accessories are available for the Color Computer — under both Disk BASIC and OS-9.

MIDI — A Star Is Born

In the early '70s, the first crude synthesizers were developed. These *monophonic* (single-note) monsters relied on analog oscillators and filters to create notes. People got the idea that if multiple synthesizers could be hooked together and synchronized, the system could play many voices at the same time. As technology evolved, analog oscillators, filters and amplifiers were replaced with computer circuitry, their digital counterparts. But because each manufacturer implemented the computers' roles a little differently, the computers could not talk to one another.

In 1983, almost a year after the introduction of the first *polyphonic* (many-note) synthesizers, a standard of sorts was estab-

lished. Synthesizer manufacturers met in Tokyo and developed what is known today as the MIDI 1.0 Specification. Since then the standard has held true to its form — it allows machines using the MIDI 1.0 Specification to communicate. Now, just six short years after its development, MIDI-based networks connect around the world.

What Makes MIDI Sing?

MIDI uses a serial communications interface making connections inexpensive and easy. The hardware usually consists of 5-pin DIN-type male connectors, which are basically the same as the serial I/O port (4-pin DIN female) on the CoCo. Only two wires are needed since MIDI uses feedback loop signaling. The MIDI 1.0 Specification recommends the use of shielded twisted-pair wire (very inexpensive) for proper grounding. This is essential when making connections or the system can fall prey to serious discharge problems and ground loops causing the dreaded audio hum. It is critical that there be no common electronic ground between devices so as to prevent a ground loop in the 1.5 mA current loop that drives MIDI devices. To control these problems, an optoisolator is used at the receiving end of MIDI signaling devices.

By design, MIDI signals run at 31.25 Kilobaud. The CoCo allows serial output at about 32 Kbaud, which MIDI seems satisfied with. Due to slight variations in chip speed performance and the fact that MIDI uses a feedback loop instead of normal bipolar RS-232 voltage, roughly 32 Kbaud does the trick. Like RS-232, MIDI uses one start bit, eight data bits and two stop bits.

As technology improves and production costs are reduced, MIDI synthesizers will become less expensive. One of two limited but MIDI-capable keyboards on the market today is the Casio MT-240, a four-channel keyboard with 44 small-size keys and 210 built-in sounds. It can function as a polyphonic keyboard or be switched to MIDI Mode 3 and controlled by the Color Computer through its MIDI IN and MIDI OUT jacks quite easily. While limited in scope and features, it is a good get-your-feet-wet MIDI keyboard and is generally available for under $150 at discount stores. Another unit to consider is the 12-voice, 16-channel Yamaha PSS-480. Usually available for under $200, it is an excellent keyboard for the serious home/hobby user and is a step up from the Casio MT-240. Moving up the line is the Casio CT-630S with a full five-octave keyboard and stereo speakers built into the case. And at the higher end is the Roland MT-32, a 32-voice synthesizer for professional use — this is where the CoCo *really* shines.

The Roland MT-32 is a synthesizer

Meet Dr. Michael J. Knudsen and Second City Software Present the OS-9 Angle

Mike Knudsen has always liked music. He plays the guitar and keyboard and in college wanted to start a computer music group, but mini computers were all that was available then — quite large and expensive.

In 1971 there were a few interesting interfaces being developed, and Mike tried some digital synthesis while mentoring some grad students. In 1977 Mike bought a KIM I kit and used some ideas he read about in *Byte* magazine to write software that allowed the playback of four-part harmony using a digital-to-analog converter.

In 1982 Mike found the CoCo. "The 6809 was like a 6502 with the brain damage repaired," he said. He wanted to do graphics, and so he wrote a BASIC compiler to transfer information from the KIM to the CoCo. He actually managed a six-voice music program on the CoCo.

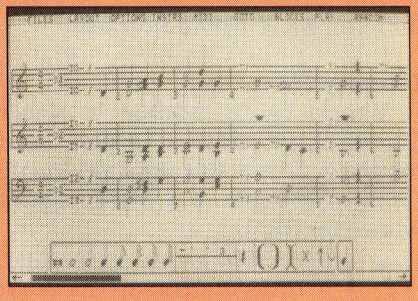
When OS-9 arrived for the CoCo, he snapped it up. In fact, he knows he got the first copy of OS-9 Level II in the entire Chicago area. Along came *Lyra*, which really fascinated him, even though it was under Disk BASIC. He continued working on *UltiMusE*, realizing that he liked his own graphics much better. Finally he rolled *UltiMusE* out of the hangar and showed it to one of the country's most active OS-9 user groups in Chicago. It was well-received.

In March of 1988 Mike uploaded the original shareware version of *UltiMusE* to Delphi and other BBSs. When Spectrum Projects went out of business,and Ed Hathaway and Dave Barnes bought all the stock, Mike went to Ed and discussed *UltiMusE*. Not long after, at the Chicago RAINBOWfest, *UltiMusE III* made its official debut and achieved unbelievable popularity.

Mike is still not satisfied though. He is working at top speed to implement a 32K buffer, which he hopes to have available by Christmas, with other upgraded features like auto-score printing and all-graphics menus.

Second City Management

One of three founding members, and president of the Glenside Color Computer Club, Ed Hathaway has been a mainstay of the Color Computer Community for several years now. As well as co-owner of Second City Software with David Barnes, he is a part-time outside salesperson for Radio Shack in the greater Chicago area. Ed first saw the Color Computer while watching a football game. It was advertised at $499.95 for a 4K Standard BASIC machine.

When he's not managing Second

City Software or working for Radio Shack, Ed has a flourishing desktop publishing business that specializes in corporate logos and line drawings. He uses the Color Computer extensively in the business, relying on the PC only when necessary. He insists he likes the CoCo much more.

Ed is a graduate of The New England School for the Arts. He has been in national sales for several publishers, including Bantam books, Harlequin and Conde Nast. Ed tries to put a CoCo into every network he sells. His vision is to see CoCo advertising in many major magazines, and he believes that *UltiMusE III* can help get it there.

designed to be hooked to a computer and external keyboard. When you hook a CoCo to this baby it is a heck of a thing to see and hear. Of course that is what MIDI is all about — hooking up the CoCo to the Roland, the Roland to the Yamaha, and the Yamaha to the Casio can create Carnegie Hall results.

Stars of the Show

There are several different types of MIDI software. It is not just a matter of being able to edit and playback music, but also the way in which music notation is carried out — how it is entered and treated by the user and computer.

Additionally there are other types of software important for library and utility functions — software that sets up controls on hardware, stores routines, settings, instruments, sound effects and the like. Equally important is the fact the computer functions as a *sequencer* or *sampler*; that is, an editor/player or digital tape recorder.

MIDI is relatively new to the Color Computer. We are lucky to have several outstanding software packages that fill the bill in the different arenas listed above and that do so both in Disk BASIC and OS-9. In this article we'll look at some products presently available for MIDI on the CoCo.

CoCo MIDI software is currently distributed by two companies — Second City Software and Rulaford Research.

UltiMuse III

Written by Dr. Michael J. Knudsen (known as RAGTIMER on Delphi), and distributed by Second City Software, *UltiMusE III* is an example of a MIDI sequencer written for OS-9.

UltiMusE III allows you to enter up to 16 musical parts or voices on the CoCo's 640-by-192 high-resolution screen. The program uses standard musical notation, which is a blessing to composing musicians and others who want to enter sheet music. If you do not know how to read music, *Ultimuse III* will give you experience in the use of music notation, although it does not teach you the specifics of music composition and transcription.

UltiMusE III features a tonal range from four octaves below Middle C to three above. Any voice can be edited at any time without requiring the user to specify a particular voice — *UltiMusE III* stays in the "strike-over" mode for all voices at all times. When you change a score object, be it a quarter note or a rest, the program automatically updates the remainder of the measure with proper musical notation. This is a sophisticated music score processor designed for high-accuracy music input and playback.

UltiMusE III is not a click-and-go program in the truest sense of the word. For one thing, there are several important differences in the click itself: the short click, long click and drag. A mouse is recommended, though you can use a joystick. The Tandy Hi-Res Interface for the mouse is also highly recommended. Without it, placement of score objects can be quite difficult. Of course, this is a result of the CoCo's inability to resolve the 640-by-192 screen with the joystick port. The Hi-Res Interface saves some frustration and is far more accurate.

Without some familiarity with music theory, it will be difficult to achieve a level of proficiency. However, this should not intimidate the prospective user as the documentation provides several hints and tips for transcribing music. The documentation is 46 pages and includes a bug report/addenda sheet as well as a tutorial to get you up and running fast. The documentation is substantial and well-written.

One nice feature of *UltiMusE* is the disappearing and relocatable toolbox of icons (notes, rests and tools) used to enter and edit music. You can move the toolbox from its habitual resting place at the bottom of the screen or even make it disappear. You can leave only the currently selected brush showing, or you can hide that too. When you have eight staves on a Hi-Res screen, having the toolbox out of the way is critical.

UltiMusE III lets you control the playback of music in a number of interesting ways. MIDI playback without additional hardware (MIDI Interface Pak) is handled by attaching a MIDI cable to the serial I/O port of the CoCo and a synthesizer. (The synth does not need a keyboard; a Yamaha FB-01 or Roland MT-32 is fine.) You can switch from the serial port to a MIDI pak with a few clicks in the MIDI menu. Want both? No problem. I used *UltiMusE III* both ways and found it to work serially and with a MIDI pak equally well.

MIDI output is handled via an OS-9 device descriptor named `PlayMI`. Dr. Knudsen began working on *UltiMusE III* in 1985. He wrote it entirely in Microware C taking full advantage of a native descriptor and OS-9's power.

During music playback you can hold the SHIFT key down to "fast forward" past sections of music you don't want to hear. Releasing the SHIFT key returns the playback to normal. Similarly, holding down the CTRL key slows down playback. You can press CTRL-C or SHIFT-BREAK at any point to stop the music and make changes.

MIDI channel assignments are saved with the scores. Therefore, if you save a score, the channel assignments currently set will be in effect the next time that score is loaded. Channel control is straightforward, and in spite of a snort or two when I first saw it, I found that the Nevermind option from the MIDI submenu came in handy a few times (ahem).

Velocity (volume) control tended to be a little finicky with some synthesizers such as the low-end Casio MT-240. The PSS-480 handled velocity changes with style and finesse.

The more familiar I became with *UltiMusE III*, the more I understood the philosophy and reasoning behind it. As a result I pushed it to see what it could do, and I was

Giving CoCo the Acid Test

For the past ten years, "David" has been composing and working part-time as a musician in the greater Metropolitan Boston area. He owns several keyboards and synthesizers, which he runs from a Macintosh SE/30 using a variety of software, including *Master Tracks Pro 3.0* from Passport Designs. I introduced him to the CoCo to get his professional opinion.

I started the ball rolling on a 512K CoCo 3, demonstrating *CoCo Max III*, *The Works* and then moved into a little OS-9. By the time we had a CoCo hookd up to a synthesizer, he had reconsidered his initial notion of the CoCo as a game machine.

We tried out a number of synthesizers — Casio MT-240, Yamaha PSS-480, Roland MT-32 and Yamaha FB-01. He tried *UltiMusE III*, *CoCo MIDI 3*, *Lyra*, *FB-01 CALC* and *FB-EDIT* for a period of five days.

He commented that overall he "really learned a lot." He went on to say, "I was surprised. If the people who make the stuff put their minds to it, they could do exactly what the Mac can do. You would have to pay about three to five times as much to just get started on the other machines. I would definitely recommend this to someone starting out or wanting to play at home. I say, good show, CoCo, you are coming on strong and doing the right thing. I'm glad I got a chance to know about the Color Computer."

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not disappointed. I also found that my own knowledge improved some, particularly after entering a difficult Mozart score (whew!).

UltiMusE III reminds me of accounting software in that it always keeps the score in balance. A user-made change in one place results in automatic compensation in others. In this respect, *UltiMusE III* is a powerful, full-featured program that rivals many of the best sellers used with other computers. However, one drawback that should not be overlooked is its relatively limited buffer space. Expansion to a 32K buffer would really enhance the program. Other omissions appear in the ease-of-use and useful features area. Dr. Knudsen is already working on several enhancements that will be released in the very near future. Some of them include virtual memory space to hold and play 32,000 notes, active use of OS-9 Level II windows, and automatic printing of scores and parts. Right now *UltiMusE* will make a screen print to a Tandy printer at nearly any point in the program other than when it is playing a score. You can even get a screen dump of the score layout or the scores themselves, which makes finding problem areas much easier. Still, the automatic score printing will come in handy.

Dr. Knudson is also working on features allowing you to copy, merge and move individual voices and/or files. (This is very important because large, multi-file scores can be loaded from a RAM disk sequentially and then played. Of course, if parts can be transferred or copied to other files, this cuts down on much redundancy of data entry.)

In summary, *UltiMusE III* is an excellent, high-performance score editor and MIDI player and is geared to the serious user who wants to put scores into the program the way they were meant to be. It has very good MIDI control capabilities for playback and is relatively easy to learn. It does not require any special knowledge of OS-9 and comes with a tutorial to get the user up and running quickly and painlessly.

Lyra 2.6.2

Now we travel across the continent to the quiet shores of Seaside, Oregon. Here, Dr. Lester Hands has startled the CoCo Community with his contributions. Along with the hundreds of song titles he has transposed, perhaps Dr. Hands' greatest accomplishment is the creation of *Lyra*.

Lyra 2.6.2 is about as Mac-like as you can get and still have a CoCo. *Lyra* runs on any CoCo with 64K or greater, with any mouse or joystick plugged into the left port. *Lyra*'s graphics interface makes it possible to load the software and start pointing and clicking right away. You can literally grab a note with the cursor and click away, entering eighth, quarter and whole notes, triplets, rests — you name it. Just grab it from the palette at the bottom of the screen and place it on the staff. One nice feature — particularly for entries above and below the stave — is the note indicator, which is located below the filename on the left of the screen above the stave. It tells you what note you are placing (C4, D7, E5, etc.).

Table 1: Definition of Terms

ADSR: Attack-Decay-Sustain-Release envelope. Most synthesizers have something called an envelope generator, which is used to define the way an audio signal varies with time. *Attack* refers to the amount of time it takes the signal to reach its peak level. The amount of time it takes the signal to drop to a *sustained* level is known as the *decay*. Finally, *release* indicates the time it takes the signal to die away after releasing the key.

Channel: A path for the communication of digital data. The MIDI standard defines 16 channels; however, not all MIDI synthesizers are designed to use all 16 channels.

Keyboard: An electronic controller or user interface, that resembles a piano keyboard. A keyboard may be monophonic or polyphonic. Some keyboards offer only one instrument sound while others offer several different sounds.

MIDI: Musical Instrument Digital Interface. A protocol/hardware standard that allows electronic musical instruments to synchronize, communicate with and control each other. MIDI also allows computer control of these instruments.

MIDI IN: An input jack on a MIDI device. NOTE: In MIDI cabling, devices are always female sockets and cables are alway small DIN plugs. Exceptions do exist, but this is the standard.

MIDI OUT: The output jack on a MIDI device.

MIDI THRU: A buffered jack that receives a MIDI IN signal and passes it on for input into another MIDI device.

Monophonic: The ability of a device, such as a trumpet, to play only one tone at a time.

Multi-Timbral: Indicates the ability of a synthesizer to reproduce several different instrument sounds at the same time. This allows the MIDI musician to create some rather impressive orchestrations.

Polyphonic: The ability of a device to play two or more tones simultaneously. A piano is a good example of such an instrument.

PCM: Pulse Code Modulation. Signal modulation that uses sets of pulses which have been assigned specific meanings. The keyboard or synthesizer that receives this signal then deciphers it and uses the information to create the different sounds and waveforms.

Sampler: This is software and hardware that allows the recording, storage and playback of digital sound. The sound can be changed in many ways. It is with a sampler that music is created on the computer, right from the keyboard, and tried on the synthesizer — or vice versa, recorded by the computer right from the MIDI synthesizer keyboard.

SMPTE: Society of Motion Picture and Television Engineers. This society has standardized a form of video timing signals similar to the MIDI standard for audio signals. The SMPTE standard allows for digital video and audio signal mixing so that audio programs can be accurately inserted between very specific video program segments.

Synthesizer: An electronic musical instrument that recreates the sounds of acoustic instruments or creates new sounds by altering the waveforms and other parameters of electronic signals. Many modern synthesizers include a keyboard for input, but a keyboard is not required.

Pressing D while over a note deletes it. *Lyra* also has powerful block commands for moving, deleting, transposing, (including with sharps and flats) and copying, as well as copying a whole voice to another or appending it to an existing one.

Lyra uses tables to control MIDI instruments and events. Staying fairly true to the PC (program change) command, *Lyra* actually stores instrument descriptions and their program numbers in a look-up table under the MIDI pull-down section. This allows the user to insert an instrument into the music wherever it is wanted, using a single byte marker. The instruments are numbered 0 through F, staying true to hexadecimal notation. A simple I and the instrument number is all it takes. Thus, when you want to change an instrument's description or change it in the music score, you need not go throughout the score changing it. Just change it on the instrument table, and you have changed it throughout. In a similar fashion, inserting an M in the score allows you to enter a byte in hexadecimal that you want to send straight to the synthesizer (it is sent unbuffered and without a channel number). You must be familiar with your synthesizer's implementation of MIDI features in order to send it direct commands in this way.

The click-on arrow keys at the bottom of the screen make it easy to move through the score. Only active voices can be edited, and only one of the eight possible voices can be active at a time. Rather than displaying the voices as entirely separate staves, the voices behind the first voice (on the same clef, of course) fade to half-tone, as do the voice indicators at the top of the screen. When the stave becomes too crowded to figure out what's what, you can click the voice indicator box until it is clear and the notes disappear from the stave — a helpful feature for complicated scores.

Speaking of big scores, the memory available to the *Lyra* user is big enough to hold all of Ravel's "Bolero" with room to spare.

It is extremely easy to click open the Files menu and load a file by pointing at it. This enables a user to enter music a page at a time and then append successive files until the whole work is in memory, at which time it can be saved.

Lyra is designed to be entertaining. You can load and play one song or play an entire disk of songs in succession by using the MIDI Play All option. You retain control over the program at all times — you can click to stop a song and return to the program or move to the next song. *Lyra* outputs to the CoCo's serial port or to a MIDI Interface Pak in a Multi-Pak or on a Y cable. With Version 2.6.2 you can actually make a MIDI Y cable and control two synthesizers at once off the serial port!

Lyra comes with *LyraPrint*, a program designed to print your scores on a Tandy, Epson-compatible or Okidata 92 printer. A small amount of setup is required before you can `LOADM "LP"` and execute it. After you supply a valid filename, it comes out on the printer.

Of course *Lyra* has its idiosyncracies as well. For instance, sharp and flat signs do not affect an entire measure but only the note they are placed with. You must also use the delay feature on the MIDI menu because some older versions of *Lyra* for older, slower CoCos make the music go too fast. But these are small points, and by and large this is a program of outstanding value. Nice little touches such as the Description option of the MIDI menu (describing what synthesizer the music was arranged for) make life easier.

There are some options available to interact with *Lyra*, such as the giant database of *Lyra* music files in the impressive *Lyra Lybrary* collection, now over 376 songs strong and growing, and also many useful utilities.

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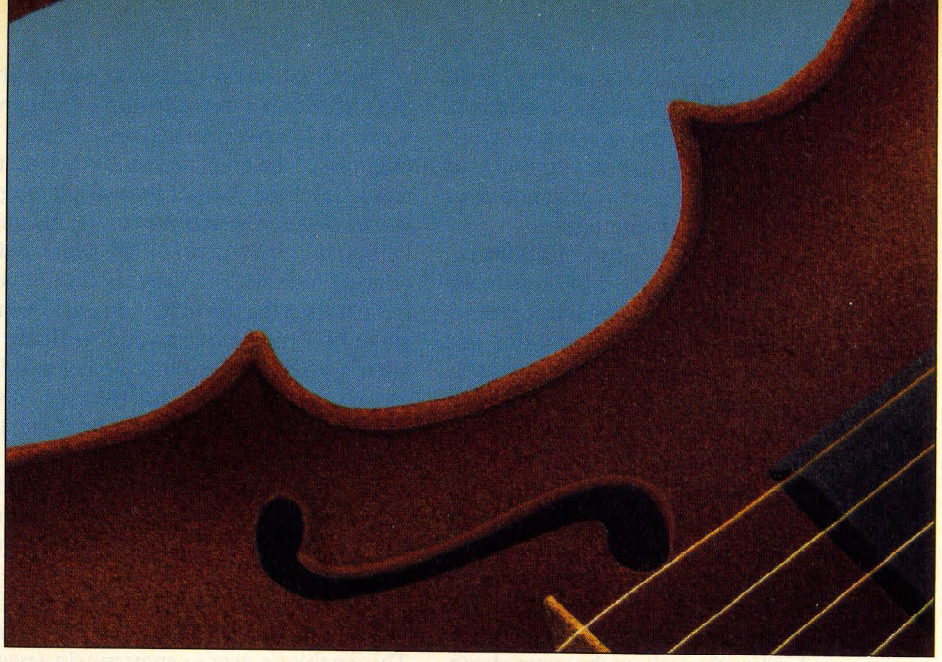
Lyra Lybrary

Lyra Library 2.0.0 is an 18-disk library of music arranged using *Lyra*. The *Lybrary* is specifically arranged in MIDI format, with four- to eight-part music selections. There are roughly 25 selections per disk. The *Lybrary* comes supplied with *LyraPlay* (a "jukebox" player), but be advised that music created with later versions of *Lyra* are not played to their full-featured capacity with *LyraPlay*. That music requires a current version of *Lyra* to be enjoyed to its fullest. Also, it is likely that users will want to change the instrument selections for certain pieces, as they were arranged with a particular synthesizer. Since there is little or no consistency between instrument program numbers, the user will probably want to use *Lyra* to edit and play the selections.



The *Lyra Lybrary* manual is full of hints, tips and instructions from Cecil Houk, who arranged most of the music included. It seems that as his collection of synthesizers grew from one to nine over the years, he became more and more creative and actually established a standard of sorts for arranging music. This allows users with low-end synthesizers to enjoy the music even more.

Like *Lyra*, *Lyra Lybrary* runs on any 64K CoCo and requires a mouse or joystick, and a synthesizer to get the full quality and features of the music. Even if you purchase the *Lybrary*, for all but the most casual music playing you'll probably forget about *LyraPlay* and load the music into *Lyra*.

CoCo MIDI 3

In addition to *FB-01 Calc* (see below) and *Lyra*, Lester has also gifted the com-

Table 2: MIDI-Specific Messages

MIDI Message: Can take a simple form like Note On or Note Off or can be very complex. It's designed to send messages through a network that will control multiple synthesizers, so that Note ONv 0 tells a synthesizer to set the velocity of a note to 0 or stop making sound. (This is often used in place of Note Off as it requires fewer bytes of memory.) Depending on the address and channel of a command, any synthesizer on the network would pass the message through, using a MIDI THRU port, or accept the MIDI message and act on it.

Omni On/Omni Off: Omni On tells a MIDI device to accept input and messages from all channels while Omni Off tells a device to accept data only on its default MIDI channel.

Poly Mode/Mono Mode: Poly mode indicates a device is to allow several notes to be played simultaneously. Mono mode tells a device to play only one note at a time.

MIDI Mode 1: Sets up a MIDI device to operate in Omni On/Poly mode.

MIDI Mode 2: Sets up a MIDI device to operate in Omni On/Mono mode.

MIDI Mode 3: Sets up a MIDI device to operate in Omni Off/Poly mode. Most synthesizers power up in this mode.

MIDI Mode 4: Also sets up a MIDI device to operate in Omni Off/Poly mode, however, synthesizers in Mode 4 can *change channels* as well, meaning that modern multi-timbral polyphonic synthesizers can play alto, tenor, bass, harmony and lead melodies all at the same time.

Pitch Wheel: A message that changes the pitch of a note or notes being played for effect. Also called pitch bend, it adjusts the pitch higher or lower for specified notes.

Polyphonic Key Pressure: Allows keyboards with pressure pads under the keys to measure how hard a key is being pressed at any given time. This *after-touch* allows the resulting sound to more closely simulate that of the acoustic counterpart. This feature is also important for other percussive electronic instruments. In situations where a non-percussive sound is selected, the after-touch often controls sound modulation parameters.

Control Change: Used to change front-panel settings on a MIDI device from within the MIDI data.

Channel Pressure: Affects the pressure at which all notes on a given channel are being played. It can be used to make an accompaniment louder or softer.

Program Change: This tells the MIDI synthesizer to change from one selected instrument sound to another. All instruments have numbers and are referred to as separate programs.

System-Exclusive Messages: These messages tell the MIDI sequencer software to load a "sound patch" file for a specific device from a mass storage unit connected to the computer. These messages are very important as they allow the user to manipulate and call on libraries of sounds and sound effects.

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munity with the only real-time interactive MIDI sequencer for the Color Computer, *CoCo MIDI 3* (*CM3*). *CM3* consists of a hardware MIDI Interface Pak that plugs into a slot of the Multi-Pak or Y cable, housing the MIDI IN and MIDI OUT ports that connect the CoCo to the outside MIDI world. With the hardware comes two cables, software and a manual. Options for a MIDI THRU port and additional buffered or switched IN and OUT ports are available.

The *CM3* software is a little confusing at first, but then seems straightforward. If you have any familiarity with MIDI and synthesizers, within a few hours you can be using *CM3* like a pro.

CM3 has more powerful features than you can shake a synthesizer at. The basic idea is that after choosing one of the ten available sound tracks, you set the sequencer (CoCo) to Record mode and play on the synthesizer what you want to record. The *CM3* acts like a digital tape recorder, saving each keypress. When you are finished recording (683 beats maximum per track), you can go into the Edit mode where your alphanumeric (not graphics) information is displayed sequentially from the top of the screen down. This includes duration, note on velocity, note name, channel and more. *CM3* lets you edit and change the data any way you want, including cloning a line, copying blocks from track to track, changing all channel numbers in a track, quantizing (evening out) blocks of music for smoother-sounding performance and more.

Two really outstanding features are Slide and Punch In/Out. Slide lets you delay or advance the music in a block you have defined, meaning you can synchronize several tracks to start at the same time if necessary. For instance, if you have started playing ahead of the music by 10 beats, you can slide the music ten beats by marking the first event you want to slide. This causes CM3 to clock off ten beats before the playing begins. Similarly you can slide the music forward to advance it ten beats or as many as are needed.

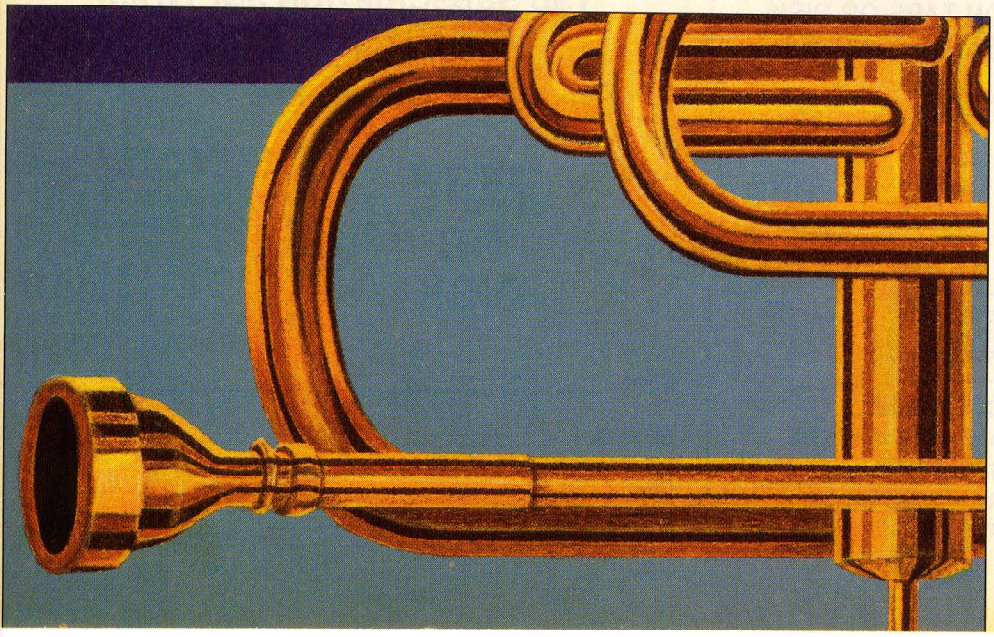
Punch In/Out is a feature used when you need to rerecord a section of music. *CM3* handles this by blocking the range of music to be rerecorded, then backing up in the music and switching to Playback mode so you can play with the music. At the right spot, *CM3* switches to Record mode and then again switches back into Playback when you have reached the end of your highlighted punch out.

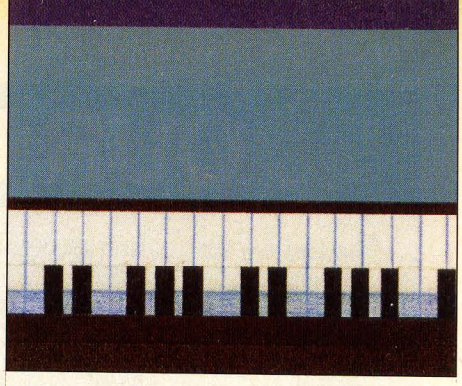
CM3 lets you play the synthesizer along with the tracks you have already recorded; you can be your own lead or accompaniment with whatever instrument you choose. You can also mute or set individual or multiple tracks to solo in order to control what you hear as you record and compose. The powerful block functions work very much like a word processor, except here they work as a music processor.

Because of all the events, every single note is available for editing. In addition *CM3* sends all the MIDI control messages including program change, control change, pitch wheel and many others — this is an amazingly flexible piece of software. Its simple menu-type controls and editing commands make it easy to learn. The documentation is thorough, giving numerous examples to demonstrate the software's features. Dr. Hands even included a conversion program with *CM3* that allows saved files to be converted to *Lyra* format.

Utilities for the Yamaha FB-01

FB-01 Calc by Lester Hands and Joseph Tributsch is an ingenious little utility designed to help you configure the *FB-01*. It is really designed to relieve the drudgery of complex calculations in decimal, binary and hexadecimal numbering systems. Because many users are not familiar with either MIDI or these number systems, *FB-01 Calc* lets you select what to hear and





then provides the numbers to get you there. *FB-01 Calc* calculates the values for 11 parameters plus starting configuration selection. It uses MIDI system-exclusive messages calculated by a channel and instrument program number to pass information to specific MIDI devices in a chain or network and not others.

The *FB-01* has 20 configuration RAM banks. Four of them are initially preset, leaving 16 for configuration. The manual for the *FB-01* describes how to operate the front panel controls to set the other 16 RAM banks, but it is in part for this reason that *FB-01 Calc* exists, to make the calculations and generate event files to be stored on disk (or in the *FB-01* as configurations) for later use. You can also customize two voice banks to contain your favorite instrument sounds. Banks 3 through 7 have 240 preset voices. *FB-01 Calc* can be used to calculate the byte values for the particular voices you want. *FB-01 Calc* affects the necessary parameters and transfers them to the synthesizer or generates event files then placed in a *Lyra* score event table. The files are looked up when the event is called from the score: instrument number, number of notes, MIDI channel, bank number, voice name, voice number, output level, octave transpose, detune, stereo assignment, LFO on/off, portamento time and set poly/mono mode.

Two interesting features require more description: Detune allows you to change the pitches by slight factors when two or more instruments of the same type are playing the same music. If they are tuned exactly, you cannot tell there are two separate instruments playing. If neither one matches the other (or several are a little out of tune), you can tell they are there.

Stereo pan allows you to set the origin of the sound, left speaker, right speaker or both speakers so you can ping-pong stereo effects back and forth as wanted. Also, slightly detuning instruments and then assigning them different stereo channels gives a much more realistic ambience to the music.

FBEDIT for the *FB-01* and CoCo 3

FBEDIT requires a CoCo 3 with 128K RAM, a disk drive and color (recommended)

or monochrome monitor. *FBEDIT* gets more specific than *FB-01 Calc*. In Play mode, you can actually play the *FB-01* right from the CoCo keyboard while the joysticks change pitch modulation and pitch bend. This has limited use due to the speed of BASIC in the CoCo 3 and joystick resolution. You must keep the pitch bend parameter small, to only vary the flat and sharp a little. Also you must move the joystick very slowly to avoid strange effects from the *FB-01*. Be certain that the *FB-01* and *FBEDIT* are set to the system channel. If you have more than one voice active on the system channel, all voices sound. The right joystick is used to simulate note velocity. All the way to the left is zero, or no sound. This is particularly useful if your synthesizer is not velocity sensitive.

FBEDIT has a very obvious and straightforward menu system that is a breeze to learn and use. Arrow keys move you to different parameters, and SHIFT-arrow keys change the parameter. Instead of being limited to the 11 parameters of *FB-01 Calc*, here you have access to edit 16 voice parameters related to each of the four operators in the voice algorithms. Some of the parameters available for editing are keyboard rate depth, AM enable, attack rate, velocity sense, decay rates 1 and 2, sustain level, release rate and frequency, using harmonic and inharmonic multipliers to arrive at the actual pitch of an operator. This is in-depth editing for the *serious* user.

Other features of *FBEDIT* include printing the parameters, transferring parameters directly to the MIDI device, storing parameters as disk files, loading parameters, sending and receiving voices and banks to and from the *FB-01*, and disk utilities to handle the same transfers to and from disks. This is a complete, easy-to-use package well-worth the expense if you are interested in editing voice data for the *FB-01*. If you are not at this level of sophistication, you would probably be better off starting out with *FB-01 Calc*. In any event, author Pierre LeBlanc has done a really fine job of putting together a powerful and full-featured editor for the Yamaha *FB-01* and CoCo.

Coda

The Color Computer has a lot to offer to the world of digital music. Even if you don't play an instrument, the Color Computer can give you the tools you need to get started.

The authors and distributors of the software we have looked at are taking strides to better their products. When it's your turn to show what a CoCo can really do, give them CoCo and MIDI together and let the good times roll!

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In addition, the MIDI 1.0 Specification is available from the IMA for $35. Write to International MIDI Association, 5316 W. 57th St., Los Angeles, CA 90056.

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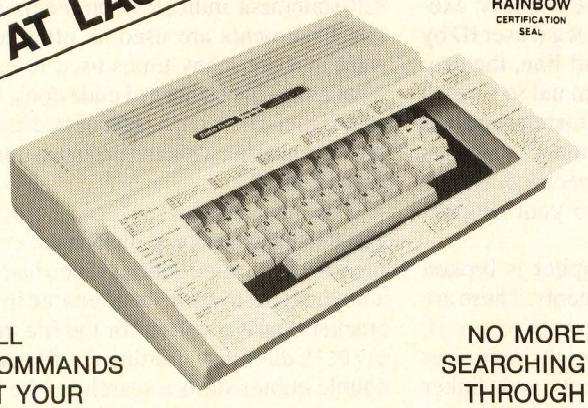

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by Greg Law
Technical Editor

BreakPoint is aimed at providing users with an insight into the techniques used by other programmers. If you have a short utility or application you believe others might learn from, submit it to THE RAINBOW to the attention of BreakPoint along with a short description of the program.

Within a multi-user environment it is often desirable for the superuser, the person logged in with a user ID of 0, to log into the system as a regular user. Opening the "door" to the system is often a chore, requiring you to know all of the usernames and passwords for each of the users. However, it is valuable for several reasons. Two of the most important are to provide the ability to check file and system security and to trouble-shoot problems reported by other users. An example of security is ensuring users do not have access to system maintenance and administrative commands such as `cobbler`, `config`, `format`, `modpatch` and `os9gen`.

As an example of trouble-shooting, let's say Sally logs on one afternoon and then reports that she can't run the word processor. The first step you might take is to check the attributes on the executable file to ensure that it has public execute and public read permissions. The next logical step is to log off and log on again under Sally's username. Then try to run the word processor. This gives you a better idea of the problem because you can see when the error occurs. You might find that Sally has set up the word processor to automatically load the spelling checker, and the dictionary doesn't have public read permission. Without trying it under Sally's username, you might not even consider the dictionary to be the problem.

Steve Goldberg has written a utility called `su` that provides a much easier and faster method of logging in under a different user ID. In the above example you log off of the system by pressing the ESC key, followed by pressing ENTER, to get the login prompt. You then type Sally's username and password. Steve's utility executes commands under any legal user ID by providing, on the command line, the user ID and optionally the command to be executed followed by any parameters required by that command. By default, `su` executes `shell` if no command is specified. In this case, press ESC to return to your original user ID.

The Microware C Compiler is broken down into six basic components. These are the executive (`cc1`), preprocessor (`c.prep`), compiler (`c.pass1` and `c.pass2`), optimizer (`c.opt`), assembler (`c.asm`), and linker (`c.link`). The compiler executive creates a shell script to execute only the phases necessary to compile the program. The preprocessor strips out all comments, expands macro definitions, and processes all file inclusions. The compiler then converts the output of the preprocessor into assembly language source code. The optimizer removes all unused and duplicated sections of code, and the assembler generates the actual machine language instructions into an object file. Finally, the linker merges the startup code (`cstart.r`) with all of the object files and includes the necessary functions from the library (`clib.l`).

The first few lines of code describe the program:

```
/*
* SU - (c) 1989 by Stephen B. Goldberg
*
* Use: su <newID>
* to operate as a different user
*
* Use: su <newID> <command> [parame
ters]
* to execute "command" as a different
user
*/
```

Any text beginning with `/*` and ending with `*/` is known as a comment just as the `REM` statement indicates comments in BASIC. Comments are used as often as you want and are many times used to explain what a specific section of code does. In this case it includes a copyright notice and then briefly explains what the program does and how to use it.

The next line, `#include <ctype.h>`, tells the preprocessor to include the `ctype.h` file with the source code as if you had typed it in yourself. Putting the filename in angle brackets starts a search for the file in the `/dl/DEFS` directory. Putting the filename in double quotes starts a search for the file in the current data directory. The `ctype.h` file contains constants and macro definitions for the character type checking and conversion functions, such as the `isdigit()` macro used in the `chknum()` function. Following this, `char buffer[200];`, declares a character array that can store up to 200 characters or a string with up to 199 characters. You lose one character because strings are terminated with the null character (Decimal 0), which is used by all of the string manipulating functions to detect the end of the string. If you pass a string variable to a function such as `strcat()` or `strcpy()` without the null terminator, you are almost

---

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

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guaranteed to get garbage and it may even overwrite important data or code. All statements in C are terminated with a semicolon, with the exception of preprocessor directives, function declarations, and conditional and looping statements such as `if`, `for`, and `while`.

The first function in the program is declared as accepting two arguments, an integer and an array of pointers to characters, or strings. The function called `main` is the first function executed when you run the program. It receives the command line arguments in `argv` and a count of the arguments on the command line in `argc`. As explained above, if you want to obtain a directory listing of the `/h0/CMDS` directory with a user ID of 1, type in:

Don't depend on local variables to contain the same values on each call to a function. They are allocated storage on the stack instead of in the data area.

```
su 1 dir /h0/cmds
```

The initialization code in `cstart.r` then processes the command line arguments into null terminated strings. Normally this is done by replacing the spaces and the carriage return at the end of the line with nulls. The end result looks like:

```
argv[0] = "su\0"
argv[1] = "1\0"
argv[2] = "dir\0"
argv[3] = "/h0/cmds\0"
argv[4] = "\0"
```

Note that `\0` is used to indicate the null character. There are certain occasions where this command line processing is not desirable. Disabling it involves placing the arguments within either single or double quotes. Alas, it isn't documented in the compiler manual, which is why I make mention of it here. This method is commonly used to pass a null argument as well as search strings. For example, if you have a command that searches a list of files for a string, you might give it the following command line:

```
search two words /h0/docs/chapte
r1 /h0/docs/chapter2
```

However, it is very likely that it will search for the word *two* in the files `words`, `/h0/docs/chapter1` and `/h0/docs/chapter2`. Putting the search string in quotes is a way to force the correct interpretation. For example:

```
search "two words" /h0/docs/chap
ter1 /h0/docs/chapter2
```

forces the command to search for the string *two words* in the files `/h0/docs/chapter1` and `/h0/docs/chapter2`. The lines

```
char *space = " ";
char *shell = "shell";
char *cmd;
int i;
```

declare the variables used in the function and initialize two of them. These variables are *local* in scope, meaning they are known only within the code block in which they are defined. It is important to remember that local variables are initialized upon entry to the function but vanish from memory when the function exits. Therefore, don't depend on local variables to contain the same values on each call to a function because local variables are allocated storage on the stack instead of in the data area.

The next five lines work as follows: First the argument counter is decremented and compared to zero. Then the first argument on the command line is checked to ensure that it is numeric. If the argument counter is zero after it is decremented or the first argument contains a non-numeric character, then the block of code between the braces is executed. This first beeps the speaker, prints a reminder of the usage, then exits with a status code of zero.

The `if/else` section causes the argument counter to be decremented again and compared to zero. If there are no more arguments, `cmd` takes on the value stored in `shell`. If there are more arguments, `cmd` takes on the value stored in `buffer`. The `for` statement copies the remaining command line arguments, separating each with a space by using the string concatenation function. In the statements `cmd=shell` and `cmd=buffer`, note that only the pointers are manipulated and no actual values are being copied. That is, `cmd` takes on the address of the value of `shell` or `buffer`.

The final `if` statement checks to make sure you have permission to change User ID numbers. First `atoi()` converts `argv[1]` to an integer value, which is then passed to `setuid()` as the desired user ID. The return value of `setuid()` is then compared with zero. If `setuid()` returns non-zero, an error occurred and the block of code inside the braces is executed. This beeps the speaker, prints the error message and terminates with a status code of 214, which is the error code for permission denied.

If you've ever taken mathematics in school, you know the fundamental rule for understanding equations is to break down the parentheses. The same rule applies when programming in languages such as C, with only a minor twist. In the `exit` statement the `system()` function is called with `cmd` as an argument, and then the `exit()` function is called. The twist is, most functions return a value that usually indicates the success or failure of the function. In this instance the `system()` function executes the command specified in `cmd` and waits for that command to terminate. Upon termination, the `system()` function returns the exit status of the command executed. This status code is then passed to the `exit()` function. In its simplest terms, the statement is written as:

```
int status;
status = system(cmd);
exit(status);
```

The two forms are identical, with the only exception being the first is much shorter and doesn't require an extra variable.

In the final section the `chknum()` function is declared with a pointer to character as a parameter and an integer as a local variable. The `for` statement in C is a little different from other languages. In BASIC the loop counts from the beginning value to the ending value with an increment of one unless it is otherwise specified. In C the `for` statement is basically the same as a `while` statement. For example, the final `for` statement in the listing is the same as:

```
i = 0;
while(isdigit(number[i])) {
 ;
 i++;
}
```

The difference is that the `for` statement is shorter in this instance, requiring only two lines of code. Looping statements always execute the statement immediately following it or the statements enclosed within braces, as shown in the `while` statement above. However, the `for` statement

above performs all of the functions necessary itself. For this reason, a null statement, indicated by the single semicolon, is used to meet the requirements of the language. The `for` statement checks each character in `number` to see if it is numeric, characters 0 through 9. The loop terminates upon reaching the first non-numeric character in `number` and returns that character to the calling function. If all of the characters are numeric, it returns the null-terminator at the end of the string. Otherwise it returns the first non-numeric character encountered. This return value is used in the first `if` statement found in `main` to terminate the program if the second argument isn't a legal User ID.

For further reading, I suggest *C Language Programming,* by Brian Kernighan and Dennis Ritchie, and *C Primer Plus,* published by Sams Books. The former provides the original specifications for the language, and the latter is primarily used as a tutorial for beginning and intermediate programmers.

❑

OS-9

The listing: `su`

```
/*
* SU - (c) 1989 by Stephen B. Goldberg
*
* Use: su <newID>
*      to operate as a different user
*
* Use: su <newID> <command> [parameters]
*      to execute "command" as a different user
*/
#include <ctype.h>

char    buffer[200];

main(argc, argv)
int     argc;
char    *argv[];
{
        char    *space = " ";
        char    *shell = "shell";
        char    *cmd;
        int     i;

        if(--argc || chknum(argv[1])) {
                printf("%cUse: su <newID> [command] [parameters]\n", 7);
                printf("       become a different user\n");
                exit(0);
        }

        if(!--argc)
                cmd = shell;
        else {
                cmd = buffer;

                for(i = 2; argv[i]; strcat(cmd, argv[i++]))
                        strcat(cmd, space);
        }

        if(setuid(atoi(argv[1]))) {
                printf("%c**** Permission denied\n", 7);
                exit(214);
        }

        exit(system(cmd));
}

chknum(number)
char    *number);
{
        int     i;

        for(i = 0; isdigit(number[i]); i++)
                ;

        return(number[i]);
}
```


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Software CoCo 3

Kyum-Gai: To Be Ninja— A Martial Arts Mission

Ninja. The very word is fraught with mystery. It exudes power. Like the pinions of an unseen bird of prey, beating the still air of a dark night, the sound of it evokes images of abilities we will never have — of victories we could never win. What might it really be like. . . to be Ninja?

Kyum-Gai: To Be Ninja, from Sundog Systems, allows you to probe that question. It runs on a Color Computer 3 with a minimum of 128K, one disk drive and a joystick. It is also extremely helpful to have a Tandy deluxe two-button joystick, although the game can be played with a standard joystick. The program disk is copy-protected, preventing you from making a personal backup, but it carries a one-year warranty against failure to load.

When playing *Kyum-Gai*, you assume the role of the Ninja champion Gai-Dan, greatest warrior of the order of Kyum-Gai, and the last hope in the order's fight against the dark forces of evil. The Kyum-Gai masters have resurrected Gai-Dan using the powers of the Life Stone and have sent him forth to do battle. The enemy, of course, is out in force to do away with him, and attacks en masse at every turn. While under my inadequate control, poor Gai-Dan hasn't a prayer, and gets slaughtered long before the enemy can be vanquished! I am improving, though.

Kyum-Gai: To Be Ninja is a remarkable game. I have found it to be loads of fun, although I am not normally a big fan of karate-style games. It has a lot of terrific features that have kept me flailing away at it long after I should have been concentrating on writing this review.

One of the first things that drew me into this game was the simplicity of the controls. I've always done best at games with one joystick and one button, but many combat games require you to learn a plethora of maneuvers using multiple control mechanisms in order to defeat even the wimpiest opponents. *Kyum-Gai* avoids that problem by paring the list of motions down to the bare minimum: move left, move right, attack and jump in any direction. Using a two-button joystick, one button attacks, the other jumps, and the stick itself is used to move left or right.

The attack button alternates between a kick to the head, a kick to the body and a punch, the combination of which is dubbed the "devastating triple attack." One additional maneuver is flipping an opponent, which is accomplished by pushing both buttons simultaneously while moving toward the opponent.

All of these techniques are easily mastered when using the deluxe joystick. With a standard joystick, the attack function is accessed through the keyboard by pressing the F key. The space bar also serves as a jump button, so it is possible to play with one hand on the joystick and one on the keyboard. I found it reasonably easy to do this, except when rapid changes in direction are necessary. In such cases the standard joystick's inability to return to center is a far bigger hindrance than the lack of a second button. After a week of playing this way I gave up and bought a deluxe joystick, and my progress improved almost immediately.

No discussion of a video game is complete without examining graphics. I played *Kyum-Gai* on my color TV for several days and found the graphics to be expansive and commendable, but often somewhat fuzzy. I then switched to an RGB monitor and was instantly impressed. The graphics are crisp and colorful, from Gai-Dan's hood to the combat fatigues of the enemy thugs. The various background scenes are often intricately detailed. When leaping among city rooftops you can see TV antennae poking above the skyline in the background, while dilapidated posters adorn the brick walls of the loading docks.

Scattered throughout the game are barrels, crates and phone booths, which occasionally contain treasures. The treasures are obtained only by smashing the container, which is accomplished by throwing or knocking an opponent into it, or by being knocked into it yourself. The containers are all rendered in careful detail, although I was slightly disappointed with a couple of the treasures. This is a minor nit, though, in the face of superlative graphics, which rival those found in more expensive game systems.

Kyum-Gai is quite extensive, and the terrain varies considerably throughout the eight levels. Beyond the necessity of fighting the endless horde of bad guys, you must also thread your way through alternative routes on each level, seeking the path of least resistance. I have only very recently (like right after I wrote that last paragraph) made it as far as Level 5, where many promising paths lead you right into an abyss. I can't wait to see levels 6, 7 and 8!

In addition to the multiple levels, there are also two basic types of villains to fight (at least through Level 5), but sometimes they are quicker than at other times. The technique for defeating the stick fighter on Level 1 fails miserably on Level 3. You have to be alert not only to the type of opponent, but also to where he is and how many other scoundrels are with him. And if you sit and think about it for too long, there are suddenly *lots* of opponents closing in on you.

Perhaps the most delightful single feature of *Kyum-Gai* is the sound. When you load the game, it asks if you are using an RGB monitor and then instructs you to flip the disk over. (The disk is a "flippy," with the program on one side and the graphics data for the various levels on the other. It is only necessary to flip it over once, where-

Master of the Ninjas

I love to play video games. I've been hooked on (and gotten extremely good at) a succession of arcade games over the years. In addition, five of the seven computer systems in our house are used exclusively for games. That turns out to be just barely enough to satisfy my 7-year-old son and me. Writing programs is something I enjoy as well. It seemed logical to me, then, to try my hand at writing my own video game on my CoCo. After spending about 50 hours on it over the course of a year, I finally had to admit that I am far better at playing video games than at writing them.

Glen Dahlgren of Sundog Systems likes to play video games too. He also likes to write programs. Fortunately for us video game addicts, Glen is far better at writing games than I am. He also readily admits that he is better at writing games than at playing them. In talking about his latest marvel, *Kyum-Gai: To Be Ninja*, Glen described one particularly difficult sequence that took him many tries to get through. "I always have to tell people," he explains, "just because I wrote the thing doesn't mean I'm good at it!"

Glen began his work in commercial game writing as a freelance programmer. He did contract work for a number of software companies, including Prickly Pear Software, Mark Data Company and Saguaro Software. For the past two years he has been marketing his work directly as the sole proprietor of Sundog Systems. "The people at Prickly Pear Software supported our beginning," Glen says. "When they decided to get out of the business, I was able to reclaim a lot of my software, and they helped me to get set up on my own." Although he now farms out certain tasks, such as copy-protection routines and marketing tasks, Sundog Systems is essentially a one-person operation.

In addition to *Kyum-Gai*, the Sundog lineup includes the immensely popular *Hall of the King* Adventure game trilogy, *Kung-Fu Dude* (another combat action game) and several newcomers: *Sinistaar*, an arcade game requiring 512K; *Paladin's Legacy*, a role-playing Adventure game for the CoCo 1, 2 and 3; and a sound sequencer called *SoundTrax*. In all, there are over a dozen products to choose from.

Despite having dabbled in a number of different martial arts, Glen says he has "never been serious about it," and the motivation for creating both *Kung-Fu Dude* and *Kyum-Gai* is largely a combination of his own love of playing such games and what he sees as an unfilled niche in the market. "There is really no one else creating combat action games for the Color Computer," he explains. "Yet if you go to the arcades, most of the games there are of this type."

Development of *Kyum-Gai* went along smoothly, even though Glen confesses it involved a lot of programming techniques he hadn't used before. Accommodating the use of the two-button joystick was a new concept, as was integrating the superb digitized sound effects into the background sounds. The end result, he points out, is "the best thing I've ever written."

Not content to rest on his laurels, however, Glen is already working on new projects, and he emphasizes that Sundog Systems is dedicated to serving the CoCo Community.

upon it is left in the drive until you are finished playing.) Once the disk is flipped over, a full-screen rendition of Gai-Dan appears onscreen, accompanied by a deep, resonating voice that booms out, "Kyum-Gai: to be Ninja!" My 7-year-old son nearly jumped out of his chair the first time he heard it, and now he makes me keep the volume low until after it's over, because, "It really scares me, Dad!"

Next, there is a very short wait while the data for Level 1 loads, and then you're on your way. As Gai-Dan fights the enemy, each time he (or an enemy) lands a blow a realistic *Thwack!* is heard. He grunts with exertion as he leaps over enemies or chasms, and groans in pain when hit. If Gai-Dan or an enemy is knocked or thrown into a crate or other object, it is smashed into pieces with an appropriate splintering noise.

Now, lots of games have good sound. The ones in *Kyum-Gai* are far superior to most not only because of the realism but also because of the way the individual sounds are integrated into the action. Nothing is truncated or scratchy, no matter what is happening onscreen. The noises are blended with the action in a completely natural way.

The documentation accompanying *Kyum-Gai* is both clear and complete. It opens with the sad tale of the order of Kyum-Gai, setting the stage for your excursions. Following this is a thorough explanation of how to insert and flip the disk, load the program and play the game. The manual not only describes the basic mechanics of game play but also some general hints on strategy and objectives, yet does not reveal things that are more fun to discover on your own.

In balancing my commentary, there are a couple of annoying things about *Kyum-Gai: To Be Ninja*. While trying to learn a reliable method for disposing of a closely packed gang of opponents, I often found myself being pummeled from two directions at once, with absolutely no chance of recovering. This is probably sour grapes on my part, and a better player might not have to endure it as often, but I hate feeling helpless and hopeless while my onscreen character is literally beaten to death.

A more serious gripe is that there is no indicator on the screen telling you what level you are on. The only clues are the brief whirring of the disk drive at the end of a level, and the resetting of the timer when you begin a new one. After playing the game for two weeks, I felt quite frustrated not being able to get past Level 2. Then quite by accident I noticed the timer being reset at one transition point. I had thought Level 2 had several stages, but suddenly realized I was consistently getting to Level 4. At least, I *think* that's where I was — I'm still not entirely sure.

Sundog Systems has another clear masterpiece in *Kyum-Gai: To Be Ninja*. It is a high-caliber product at a very reasonable price.

(Sundog Systems, 21 Edinburg Drive, Pittsburgh, PA 15235, 412-372-5674; $29.95)

—Jim K. Issel

Software CoCo 1, 2 & 3

Jack Rabbit Story Writer— Electronic Muse for Children

It wasn't until I was almost 30 that I discovered I love to write. Writing gets into your blood. I've found I have to write even if no one is willing to pay me for it. My only regret is that I didn't start writing earlier, because I'm sure I would be a better writer today.

I don't remember any of my elementary instructors teaching us much about creative writing. Of course, teaching creative writing to a large group of children is a formidable task, but now there is a way to make the job easier. E.Z. Friendly Software has created a program called *Jack Rabbit Story Writer* that helps children learn how to write short stories. This program was designed for and runs best on a CoCo 3, but will also run on a 64K CoCo with Extended Color BASIC. The program requires a disk drive and printer.

Although you can use any kind of printer, you must use continuous-feed paper. Before using the *Jack Rabbit* program you need to configure your printer by running another program on the disk called CONFIGUR.BAS, which allows you to choose your printer's baud rate and set up the printer for underlining. You need to run CONFIGUR.BAS only the first time you run *Jack Rabbit*, or if you change printers. I was pleased to see this configuration program because I have used a number of programs lately that don't allow the baud rate to be set. Often I am ready to print only to find that the baud rate is incorrect. Sometimes this means aborting the program with a loss of data. A simple routine like CONFIGUR.BAS takes care of the problem.

Although *Jack Rabbit Story Writer* is in part a simple word processor, it is also much more. What makes it outstanding is that it helps young people to develop story ideas. Everyone who writes has experienced writer's block — even the young writer.

If the "Thinking Up a New Idea" option is chosen from the simple five-option main menu, the child is asked if he or she wants to write about a person, animal or thing. If the student chooses an animal, for example, 25 different animals are presented to write about. Children are not limited to animals on the list — they can type in anything they want. Then the young users are prompted to type three things about the animal. For example, if the child chooses to write about a horse, he or she might say that the horse is brown, that he runs in races, and that last year he won a trophy.

Children are then presented with nine things that might happen to the story's main character. After choosing one of these suggestions, they have to tell why the main character might have this experience. After the student answers all questions, the computer puts everything together and forms the story idea. It displays the story idea onscreen and asks the child if it is a good one. If the child agrees that it is, the story idea is printed out. If, after reading over the idea, the child decides he or she doesn't like it, he can press N and start working on another one.

Another excellent feature of this program is its ability to help its users develop an outline. When students choose this option, they are prompted for several main ideas. The program then asks the child to decide what order the ideas should be in.

***Jack Rabbit Story Writer* is excellent. I have been unable to find another commercial program like it in the Color Computer world.**

After entering all the main ideas, the student has to back up each of them with one or more supporting ideas. When the student is finished, the outline is printed out with all the ideas in order.

After the story idea is created and the outline is prepared, the child can select Option 1 on the menu and begin typing the story. A simple word processor is provided; it has a 32-column display and limited editing capabilities, though it does support underlining. The word processor has deliberately been kept simple to make it easy for a child to use.

The word processor comes with a dictionary, which is accessed by pressing the @ key. The dictionary contains 7000 words between four and 10 letters in length. If young people are unsure of how to spell a word, they can press the first letter of the word after pressing the @ key, and then scroll through the words. Only three words appear onscreen at a time.

A story can be saved to disk at any time during a writing session, and a backup of the story can be made at the same time. It can be loaded back in at a later date by choosing the Checking A Saved Story option. After the story is loaded in, two lines at a time are displayed on the screen. If there are any errors, the child will have to retype the two lines displayed. *Jack Rabbit Story Writer* allows for only minor editing. If there is any major editing to be done, the story has to be retyped. After correcting all errors, children are asked if they want to add more to the story. If they agree, they enter the word processing mode and begin to write.

After the story is finished, the child can review it again, make corrections and then print it out. When I first received *Jack Rabbit Story Writer*, I had trouble getting anything to print out. I contacted E.Z. Friendly Software and within a couple of days received a new version of the program, which worked flawlessly. I had the chance to talk with both the author and his wife on the phone and was impressed by their courtesy and professional attitude.

Although the documentation states that the program is for grades 2 to 8, some 7th and 8th graders may find it too simple for them. The author of *Jack Rabbit* advises parents and teachers to guide the student through the program the first time. This is especially true for students in the lower grades. The 10-page manual is more than adequate, and some students in the upper grades might be able to run the program without help the first time.

Although there is always room for improvement in any program, *Jack Rabbit Story Writer* is excellent. I have been unable to find another commercial program like it in the Color Computer world. My children find it not only educational but fun to use. Because I enjoy writing and think it is important for children to learn to write well, I am excited by this program. My mother, a 2nd grade teacher, thought it would be a useful tool for any classroom as well as the home. She did comment, and I agree, that students should know some basics about writing prior to using the program. For example, they need to know how to write a complete sentence and what constitutes a paragraph.

You want your children to be able to communicate intelligently with other people. *Jack Rabbit Story Writer* can help them learn to communicate effectively by teaching them how to organize their thoughts in a logical way. All writing is creative, and learning how to write short stories will improve writing skills in other areas as well. After your children use *Jack Rabbit Story Writer* for a while, maybe you will even be able to understand the notes they leave you. The price is well worth it when you consider that you will be helping your child build skills that will last a lifetime.

(E.Z. Friendly Software, 118 Corlies Ave., Poughkeepsie, NY 12601, 914-485-8150; $24.95 plus $1.50 S/H)

—Dan Weaver

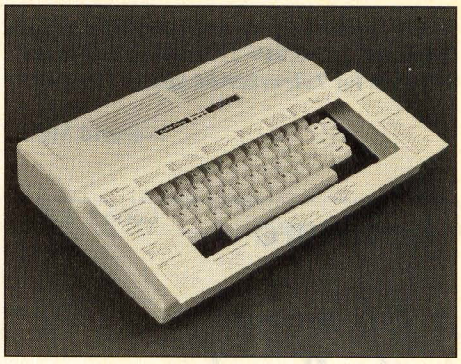
CoCo 1 & 2

Firmware

Telewriter Keyboard Templates— No-Hands References for *Telewriter*

To repeat an old saw, "Build a better mousetrap and the world will beat a path to your door." How many times have you wished you had "thought of that"? Me, I can't count them. Recently I had cause to lament a missed opportunity when I received for review simple, clever and yet inexpensive products for those of us who use the *Telewriter-64* and *Telewriter-128* word processing programs on our CoCos — keyboard templates for *Telewriter*, one each for the two versions of *Telewriter*.

I was delighted to get a chance to review these templates from P&M Products. Each template is a 14.75-by-6 inch rectangle of laminated paper, with a cutout for the CoCo keyboard; it fits nicely around the keys. When positioned on your keyboard, the template offers an at-a-glance reference to the commands and features of *Telewriter*.



Everything you need to know is right there in front of you — beautifully and boldly typeset — so you no longer have to resort to the manual to find the information you need during a word processing session. The template contains simple, abbreviated descriptions for all the various function keys, commands and control keys. Everything is covered, including Control-key commands along with Editor, Format Menu, embedded format, Main Menu and miscellaneous commands.

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These keyboard templates are really handy, and I use the *Telewriter-128* version constantly during my word processing activities. Both the *Telewriter-64* and *-128* versions are sure to be hits with CoCo users.

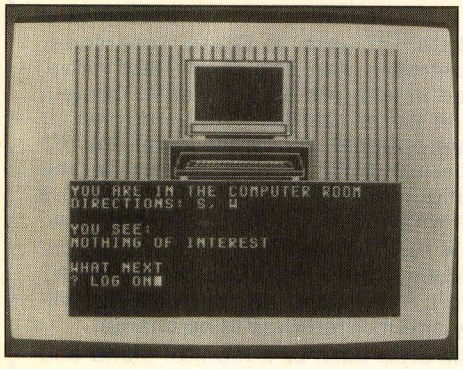
(P&M Products, 1003 Shalimar Drive, High Point, NC 27260, 919-279-3091; $4.95 plus $2 S/H each for *Telewriter-64* and *128* versions)

—David Miller

Software CoCo 1, 2 & 3

A Diamond in the Rough— To Steal the Tandy Diamond

If it's been a while since your last graphics/text adventure fix, you might want to take a look at *A Diamond in the Rough* from JR & JR Softstuff, the same company that publishes the excellent arcade game *Revenge of the Mutant Miners*. In *Diamond in the Rough* you play the part of an apprentice to a "master thief for hire," searching for — what else — the Tandy Diamond. You wander around Tandy mansion, attempt to pick up clues, grab a bite to eat, and try to keep from falling into the pool.



You start out in the study, where you see a desk and a picture on the wall. From the study you can go into the kitchen, and from there into nine other rooms. Rather ordinary rooms they seem, except for the pool room — not as in billiards but as in water. Whoever lives in the Tandy mansion must be rich. One room that particularly caught my attention is the computer room. In there is a computer that looks quite a lot like a CoCo. After LOOKing at it, I attempted to access it. Rather rudely, it requested a password from me, then promptly denied me access when I failed to guess correctly. In another room I encountered a robot.

Requirements to play *A Diamond in the Rough* include a disk drive and a CoCo 1, 2 or 3 having at least 32K. The PMODE4 graphics are rather nice. CoCo 1 and 2 users are instructed to go through the standard routine of pressing the Reset button if the screen is blue and pressing ENTER if the screen is red. (CoCo 3 RGB users need to run an RGB patch program if they don't like black-and-white graphics.) The playing screen is divided vertically into two areas: Graphics occupy the upper half, and the lower half is reserved for text display and command entry. The game comes on two disks; dual-drive systems are supported.

You start out in the study, where you see a desk and a picture on the wall. From the study you can go into the kitchen, and from there into nine other rooms.

This adventure is of the standard verb/noun genre. Verbs such as LOOK can be shortened to just one letter (L, in this case). For example, you can type L DESK to look at the desk. Also following text adventure game standards, *A Diamond in the Rough* permits you to abbreviate directions, such as N for NORTH. You'll need to take advantage of abbreviations because text entry is limited to nine characters.

As you might guess, the game does not understand elaborate and complex commands. To commands it does not understand it responds with "It is beyond my power to do that," or occasionally, "You must be kidding!" I find the verb list to be limited and unimaginative. There's no frustration factor here. Kicking things yields neither results nor pithy comebacks.

Sour grapes, maybe? OK, I admit I didn't solve the mystery. I have LOOKed at everything in all 11 rooms. I truly did GET everything there was to be got, I think. Of course I am missing something. Probably something embarrassingly simple and obvious. So far I've acquired a paper clip, baby oil and some food. Maybe I should try feeding the food to the robot.

The program is written in BASIC, though enhanced with machine-language subroutines. I got the brilliant idea of listing the BASIC file. Unfortunately, a tangle of GOSUBs made it nearly impossible to learn anything of value — all part of the author's plan, I suppose. I did happen across a mention of a car — since I did not come across a car in the house, there must be a way outside, at least to a garage. I will leave the task of finding the car to a better adventurer. I guess when I'm desperate enough I'll order the $3 hint sheet from JR & JR.

(JR & JR Softstuff, P.O. Box 118, Lompoc, CA 93438, 805-735-3889; $19.95 plus $3 S/H)

—David Gerald

Software CoCo 3

Wheel of Fate— Another Spin Into Familiar Territory

"Spin the wheel, buy a vowel, solve the puzzle on the Wheel of Fate."

Sound familiar?

Wheel of Fate, from Robert Gatton, is a computer simulation of the popular TV game show *Wheel of Fortune*, requiring a CoCo 3 and one disk drive. The program is supplied on one disk along with two files of puzzles and two companion utility programs. The disk is not copy-protected.

Since there are at least two other versions of this game available from advertisers in THE RAINBOW, as well as one that appeared as a listing in the magazine, *Wheel of Fate* must be very good if it is to measure up to its competitors.

One to three people can play this updated version of Hangman and accumulate scores, the 10 highest of which are saved to disk. But is it worth the asking price of $19.95? A brief description of my experience may help answer this.

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a-half pages of documentation, which does *not* include loading instructions. I had to look at the directory to determine that I needed to type RUN"FATE" in order to begin the game.

Next a screen appears asking what file to use, defaulting to PUZFILE1 if none is selected. No indication is given at this time of what files exist on the disk. You must either write them down as they are created or type in DIR before beginning the game to see what is available. Once the file is selected, the user indicates whether a TV or RGB monitor is being used, and the game begins after a short pause. The blank letter area is well done and looks like the TV game show board. Following the onscreen prompts, you can now play the game.

When I received the game for review and noticed it was written for the CoCo 3, I had high hopes for the sound and especially the graphics. Vanna, who does stand at the side of the game board and clap as the wheel spins, looks like Raggedy Ann. During game play, a multicolored wheel in the lower-right corner uses the PALETTE command to revolve, and the background of the game board changes colors. The sound is particularly annoying, consisting as it does of various permutations of a single-pitched beep. After a couple of revolutions of the wheel accompanied by a string of such beeps, you reach frantically for the volume control.

There are glitches in the play of the game itself. Although the TV version allows hyphens and apostrophes, *Wheel of Fate* does not. You find this out for yourself after creating a new data file and watching the game crash during use of that file. If a player guesses a vowel during a turn when a consonant is called for, which is not an unusual occurrence among young players, the game beeps. If the vowel is guessed again, the game accepts it on the used-letter board, but will not recognize it in the puzzle. On at least one occasion the game put a consonant on the used-letter board without using it in the puzzle, only to accept and use the same letter many guesses later.

To be fair, the categories in PUZFILE2 include computer and science terms, mythical creatures and dinosaurs. The categories are extremely challenging, but unfortunately many words are misspelled.

Two utilities are included on the disk. MAKEDATA lets you make your own puzzle files. The utility CLEARHI is supposed to clear the file containing the high scores — but it doesn't work very well. Both utilities must be loaded and run separately from the game — not particularly user-friendly.

Children enjoy this game, provided a puzzle file exists containing subjects familiar to them. Considering what is available in the CoCo market for $19, *Wheel of Fate* doesn't seem to be in the same ballpark.

(Robert Gatton, Route 1, Box 93, Olin, NC 28660, 704-546-2423; $19.95)

—Richard Gordley

CoCo 3

Software

Z'89— Stalking the Robot Overlord

Query: What game sends you hurtling through the airspace of a hostile space fortress, searching out an evil enemy who throws missiles in your path? What game gives you 3-D graphics that let you zoom up and down in addition to left and right? What game has phaser/blaster sound effects so realistic you think you're in a movie theater watching a screening of the next *Star Wars* saga?

Answer: *Zaxxon*? No — *Z'89*, a brand new arcade shoot-'em-up-fest from Game Point Software.

Some of you may remember a similar game out for the CoCo a few years ago. *Z'89* is its big brother — a 100-percent machine-language adaptation of the arcade game *Zaxxon*, written in 100-percent machine language by Steve Bjork to take advantage of the CoCo 3's graphics and sound capability. With this game you hear every zoom, vroom and boom. A digitized voice even greets you on startup, asking in a theatrical tone for you to select your monitor type. You'll need a CoCo 3, a joystick, a TV or RGB monitor, a disk drive, and perhaps a partner. *Z'89* supports one or two players.

I played the game using an RGB monitor and was pleased with the graphics. *Z'89*'s graphics easily equal the quality you'll find on a stand-up arcade version of *Zaxxon*. *Z'89*'s animation, however, is a little slower — but still very playable.

For those who aren't familiar with *Zaxxon*, the scenario goes like this: As you're spacing through the galaxy, banking left and right and exercising your ability to engage in limited vertical movement (a few inches on your screen — a high/low bar indicates your height), you find yourself on a collision course with a brick wall. The wall, of course, is your introduction to a hostile space fortress ruled by a robot overlord. There is an opening at the top of the wall, and you take aim for it, because "there ain't no turning back."

With the arcade version of *Zaxxon*, to make it through that opening I usually pull back the stick to reach the highest altitude possible and maneuver myself through the gap at the top. This gets me nothing but crashed with *Z'89*. After about 10 times of smashing into the wall and spreading my ashes among the stars I gave up in frustration and turned my attention to the documentation, which though well-written was of no help to me with my immediate problem. When I happened to glance at the screen, I saw that somehow, *miraculously*, I was in the fortress, flying over what looked like Exxon City, and about to be demolished by a red missile bearing down.

I was demolished, but I had proof that getting in could be done; so I set to experimenting. I found that to get over the wall, you *don't* have to squeeze through the opening. Just drift as far right as possible and pull back on the joystick to go as high as you can, and you'll sail right over.

You are drawn on a path through space and the fortress on what looks like an upward 40-degree path. The perspective is up in the air and to the right, back about a hundred feet or so. While in the fortress you can easily determine your height by watching the high/low bar or your shadow: The higher you are, the farther away the shadow. The perspective takes some time to get used to. It might help to tilt your head 40 degrees to the right.

Your job in the fortress is to blast anything and everything (by pressing the joystick's firebutton). There are planes, radar towers and things that look like holding tanks for gasoline (there are a *lot* of these things, hence "Exxon City"). There are

also missiles. Vertically launched white missiles shoot out of holes in the ground, and red homing missiles come straight at you, following your every movement. You can shoot the missiles if you're fast enough. And you can maneuver around the white missiles, but not very easily around the red ones. The red missiles plagued me until I discovered an easy way to deal with them: Stop moving left and right — when you do, they do, and then they are easy targets.

And that's the end of the tips you'll get from me, because I am not very good at arcade games, even though I like them a lot. My best score so far is 7500, but I have not been able to make it past Level 1. I *can* make it out of the fortress into space, but some weird, dodging and diving red spaceships usually make mincemeat of me. If I had more time, maybe I could figure out how to avoid them.

I know that much, much higher scores are possible, because the game comes already "broken in": Steve Bjork is on the scoreboard with 100,000 (attaining Level 8); Game Point's Pete Ellison comes in second with 75,000 points (attaining Level 6); and Nikolas Marentes, the programmer of *Rupert Rhythm* and *Space Intruders*, comes in third with 50,000 points (attaining Level 4). Guess who came in fourth? (By the way, guys, how do you manage to get your scores so nice and even?)

I highly recommend *Z'89*, especially to *Zaxxon* fans who own a CoCo 3. Wonders await you. Who knows what lies in Level 2 and beyond?

(Game Point Software, P.O. Box 6907, Burbank, CA 91510, 818-843-3405; $29.95, $24.95 introductory special)

—Carol Hartman

Software CoCo 1, 2 & 3

Disassembler— Cracking Machine Code

Writing programs in assembly language is a lot like digging a fence post hole with a tablespoon. It takes a lot of steps, but you have complete control over all the dirt. Once you've written such a program, it must be translated into machine language (binary instructions) by an assembler. A disassembler, then, is a program that translates in the other direction. That is, it takes a machine language program and translates it back into assembly language. Fortunately, that isn't as difficult as getting all the dirt back into the post hole in the same configuration it started in.

Disassembler from BDS Software is a no-frills program to do such a reverse translation. It comes on a non-copy-protected disk, and runs on any Color Computer. Accompanying the disk is a two-page write-up on how to use the program.

Upon running *Disassembler*, you are asked to enter the name of a file you want to disassemble. If no filename is entered, the program allows you to disassemble code already in memory (including system ROMs). You are then asked if you want the display in decimal or hexadecimal format. Although you are prompted for this choice at the beginning of the program, you can change it as often as you want during the disassembly process.

If you do not enter a filename, you are asked for a starting address at which the disassembly is to begin. If a filename is provided, disassembly begins at the execution address of the file. The first instruction at that address is displayed. Pressing the down arrow key causes the program to move on to the next instruction, disassemble it and display it. The up arrow key

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moves the disassembly in the opposite direction. Pressing E exits the program and returns you to Disk BASIC.

There are a number of straightforward conventions adhered to in the disassembly process. Unknown opcodes, for instance, are displayed as ??. When a branch instruction is displayed, the destination is displayed as an absolute address, rather than a displacement. Push, pull, transfer and exchange commands are displayed with the registers they act on, rather than simply the raw postbytes. Also, the documentation specifies which instruction is displayed for those opcodes that translate into more than one instruction mnemonic, such as BHS and BCC. I find these conventions clear and workable.

This program is quite simple to use, but rather disappointing in its lack of features. There is no provision for printing the disassembly, although I suspect it isn't too difficult to patch it to do so. Once the program has a starting address, your only choices are to go up or down one instruction. Jumping to a different address requires restarting the program from scratch. There is no key repeat, so to advance a number of instructions, you must keep tapping on the down arrow.

But *Disassembler* offers one very important consideration: For $5 it is a heck of a lot better than writing a disassembler of your own!

(BDS Software, P.O. Box 485, Glenview, IL 60025, 312-998-1656; $5 disk only)

—Jim K. Issel

Software CoCo 1, 2 & 3

OS-9 Pascal 2.0— A Pascal Compiler for Levels I and II

Pascal is the current language of choice in many colleges and universities for teaching structured programming methods. It has also become popular on MS-DOS machines because of packages such as Borland's *Turbo Pascal*.

This is a review of the *OS-9 Pascal* compiler — not the Pascal language. How well the language is implemented is of primary interest. Because the Pascal language has a standard (several, actually), it is fairly straightforward to compare the language as implemented to the selected standard. Microware Systems Corporation (from whom Tandy licensed *OS-9 Pascal*) chose to implement ISO Standard 7185.1 Level 0.

It so happens that I own a copy of the Pascal "bible" referenced by the documentation. *OS-9 Pascal* compares favorably to the Pascal described in this book by the creators of Pascal (*Pascal User Manual and Report* by Kathleen Jensen and Niklaus Wirth). There are differences, mostly nonstandard enhancements and machine-dependent implementations. The few differences do not appear to have serious drawbacks in using standard Pascal with this compiler.

The *OS-9 Pascal* compiler is a little unusual in that it produces executable *pseudocode* that can then be further translated into 6809 assembly code. The pseudocode is executed by one of two runtime modules, one for smaller programs and the other for very large programs.

An important aspect of any compiler is its ease of use. You don't want to spend more time fooling around with the compiler than it took you to write the program. Ideally you should not have to pay much attention to the compiler at all. *OS-9 Pascal* does not quite meet this ideal state.

This implementation of Pascal does not have an integrated environment such as is found in BASIC09. Programs must be created and corrected in a separate text editor (such as `edit` or *DynaStar*). The source file is then used as input for the compiler to create the compiled program. Once it is successfully compiled, the program can be executed from OS-9.

The *OS-9 Pascal* compiler is a little unusual in that it produces executable *pseudocode* that can then be further translated into 6809 assembly code. The pseudocode is executed by one of two runtime modules, one for smaller programs and the other for very large programs (in which swapping code in and out of memory is required). This swapping allows Pascal programs to be executed that would not otherwise fit in memory. The assembly code version, once assembled, should run faster but is apt to be bigger (so says the documentation). I noticed no real speed difference in the small test program I used. A special linkage editor is provided to combine machine and pseudocode modules into one execution package. This allows libraries of common functions to be built and used.

The required assembler is part of the OS-9 Level I package for which this compiler was developed. While I still have Level I and a CoCo 2, I also have a Level II and a CoCo 3 — so I decided to see how well *OS-9 Pascal* would do on the new stuff. The results were not promising until I scrounged around and found the following patch (courtesy of Greg Law via the OS-9 Forum on CompuServe):

Offset	Old	New
0697	21	25
1692	21	25

The changes are made to the `Pascal` module so that it can properly locate some of its files. Remember, if you choose to make this patch, never make changes to your original source disks. Always make these changes to a working copy.

After I installed this patch, I had no problem using the compiler with OS-9 Level II, although I did not try to translate the pseudocode to assembly. There are other patches for *OS-9 Pascal* available, but I did not try any of these for this review.

The compiler package is delivered on two 35-track, single-sided disks (standard for the CoCo). While the package is usable in this format, I copied it to a single 40-track, double-sided disk. This was much more convenient.

The documentation included with the compiler is a reference manual. As it states in the introduction, "Either you know Pascal or you don't." If you don't, this manual won't help you learn and you will need to supplement it with other sources. If you *do* know Pascal, the manual does cover the basics on using the compiler and provides a reference to Pascal as implemented for Tandy OS-9.

OS-9 Pascal 02.00.00 is comparable to MS-DOS versions of the same language in features and list price. Unlike the MS-DOS versions, discounts are harder to come by. Your best bet pricewise is to find a copy as a "managers special" at a Radio Shack. Support is provided by Tandy through the Radio Shack stores and computer centers.

OS-9 Pascal 2.0, which is not copy-protected, runs on any machine that sup-

ports OS-9 Level I or OS-9 Level II (with a patch to Pascal). Requirements include a Color Computer 1 or 2 with 64K or a Color Computer 3 with 128K, a text editor and two or more standard CoCo disk drives. Effective use requires a printer. A hard drive or high-capacity floppies (360K or 720K) will make life easier. To make full use of its features requires the assembler, which is supplied with OS-9 Level I but not with Level II.

(Tandy Corporation, 1700 One Tandy Center, Fort Worth, TX 76102; $99.95: Available through Express Order at Radio Shack stores nationwide, Cat. No. 26-3034)

—Jesse R. Strawbridge

Software CoCo 1, 2 & 3

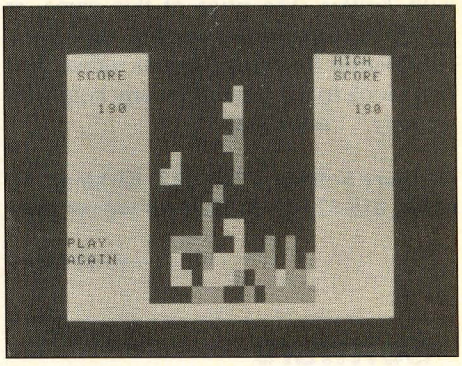
Trythis— A Game of Reflexes

Trythis is an arcade game that works on most anything — tape or disk, CoCo 1, 2 or 3 (32K required). CoCo 3s need to be in the CoCo 2 mode (32-column width) for it to run, though. Using your right joystick or the keyboard, you manipulate shapes as they fall from the top of the screen. The object is to fill up your screen with the shapes and build your points. The more shapes you can place, the higher your score goes. The game ends when the shapes have nowhere to go.

If you are an adult who doesn't know what you are doing, the screen fills up really fast. As you get better, or if you are a child, or familiar with the game *Tetris*, you can sit and play *Trythis* all day. As soon as you fill up a single row completely, it disappears and all the other rows of shapes "settle" to the bottom (kind of like what they say your cereal does in the box). As long as you keep filling rows and having them disappear, you can play forever.

There are three skill levels, and the only difference I can see among them is the speed with which the shapes fall. Not only do you manipulate the shapes into place left and right with the arrow keys or joystick, but you can also turn them in 90-degree increments.

Trythis is for all players. It will keep a preschooler occupied and also develop hand-eye coordination, but don't tell them that. They'll just think it's fun. The simple shapes and bright colors fascinate them. I also recommend the joystick for the preschoolers. Anyone from the elementary age up had better have a "Try-This Anonymous" phone number handy though... the game is *very* addictive, even for those playing on the advanced skill level. It's a simple game, doesn't require much thought, and is perfect for any executive or student trying to relax after a hard day at the computer. I took it to my users group meeting and had a difficult time prying the joystick away from the eager line of players so I could do our scheduled demo.



The manual is short, but then this game is so easy to play you don't need a lot of instructions. The manual does not mention telephone support, providing only an address. The main thing that disturbs me about the manual is that there is no mention

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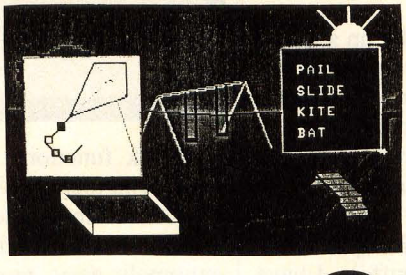

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of any kind of guarantee. Since the disk is not protected in any way, backups aren't a problem. My concern would be a case in which a buyer received a disk that had somehow gotten mangled by the postal service. However, when contacted, Bruce Gregory of Gregory Software assured he would be "more than happy to replace any damaged magnetic media" for bona fide customers who request such replacement.

As an added bonus, Gregory Software includes a joystick-driven menu program with *Trythis*. The price of this game, at $9.95, is certainly reasonable, especially considering its entertainment value. Just don't look to the manual for any help with strategy. . . ask a kid.

(Gregory Software, Box 573, Kirkland, IL 60146, 815-522-3593; $9.95 for tape or disk)

—Gail Allore

Software CoCo 3

Window Writer— Word Processing With Windows

Window Writer from Cer-Comp is a powerful word processor and text editor written for 512K CoCo 3s with a disk drive. It utilizes a point-and-click user interface that supports either a joystick or mouse connected to a high-resolution joystick adapter. *Window Writer* runs under Cer-Comp's *Window Master* environment and makes full use of *Window Master*'s outstanding features, including excellent graphics, lots of windows, pull-down menus and icons — all of this without OS-9. It uses a screen-formatting system that lets you embed various commands in your text file, resulting in printed output of professional quality, limited only by the features of your particular printer.

If you don't have *Window Master*, you can still run this powerful word processor by purchasing *Window Writer/W* for $20 extra. *Window Writer* is not copy-protected, so be sure to make yourself a backup of the disk for safekeeping.

Starting up *Window Writer/W* is simple. If you want to boot it up from a cold start, just type in `RUN "WWRITER"` and press ENTER. This automatically loads in a runtime version of *Window Master* before it loads *Window Writer*. If you are already running *Window Master* and want to boot up *Window Writer*, just type in `RUNM "WWRITER"` and press ENTER. After a few minutes of disk activity you will see the *Window Writer* title screen. You'll also notice a black-and-white menu bar at the top of the screen and below that three rows of blue boxes with the names of commands in them — these boxes are called *buttons*. Both the menu bar and buttons are activated by moving the pointer arrow to the appropriate command and pressing the mouse or joystick button.

Window Writer is a powerful word processor that is fun to use, very user-friendly and has a price tag that represents an outstanding value. The powerful _Window Writer_ environment compares favorably to that of Microsoft _Windows_ under MS-DOS.

The Menu Bar

The menu bar holds six options. When a menu option is selected, a drop-down menu appears. The six menu selections are:

Files
Edit
Display
Misc.
Format
Printer

The Files Menu

A wide variety of I/O options are accessed from the Files menu; most are self-explanatory. Options available from the Files menu include the following: New, Load File, Save File, Save As, Append File, Directory, Roll Text to Disk, Get More Text, Open Output File, Kill File, Backup Disk and Quit.

The Load File option calls up a directory/file selection window from which you can point and shoot to select a file. This is a very professional and user-friendly way to go about file I/O, and is reminiscent of the MS-DOS *Windows* environment.

Save As saves the buffer to a filename you specify. *Window Writer* has quite a few commands that pertain to buffers. I have not seen so much attention paid to this in other word processing programs and was at first wondering what all the fuss was about. The buffer commands, it seems, help you handle files larger than memory allows. In essence, although the graphics environment places a large overhead on *Window Writer*, you are not limited to skimpy, small files.

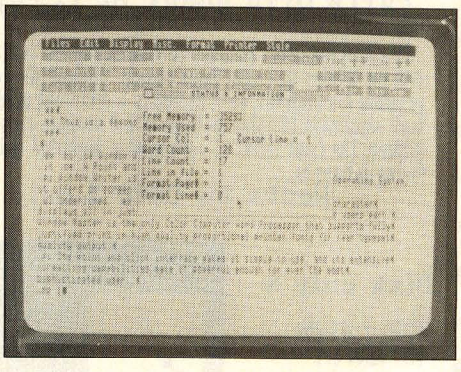
Append File simply lets you add onto the file currently displayed — if the buffer will be overfilled, you are prompted to open an output file to store the excess. Roll Text to Disk is used when you want to send part of the buffer to disk to make more room or get additional text from the input file. Get More Text is used in conjunction with an input file that is larger than memory; it allows you to fit more of the input file into the buffer. Open Output File opens output files for text storage. It is used when the buffer is almost full and you need more space for adding text. (If you load a file that is larger than the buffer, you are prompted for an output file identification and drive specifier.)

I find the Backup Disk command a very handy feature. *Window Writer* forms its own cozy little environment; you'll find few reasons for leaving it.

The Edit Menu

The pull-down Edit menu is where blocks of text are dealt with, and also where search functions are initiated; in *Window Writer* these functions are called Find Next and Find & Change.

When selected, Find & Change pops up an Edit box that asks you for the string you are looking for and the string you want instead. You can specify case-specific matching, and you can also select a match for *whole words only*. For example, if you were searching for the word *are* and had not selected this option, the computer would stop at the word *housewares*; otherwise it would stop only at the word *are*.



Block functions supported under the Edit menu include Undo along with Copy Selection, Move Selection and Delete Selection. The method for selecting text is extremely easy, requiring the mouse or joystick. The mouse pointer is in the form of a text I-Beam. You can move this pointer anywhere on the screen and then click to place the cursor. Selecting text simply involves pressing and holding a button at the beginning of the block to be selected

and then "dragging" to the end. When the button is released, the selected text is highlighted and ready for action, whether it is to be copied, moved or deleted.

Text can be highlighted and copied/moved/deleted without resorting to the Edit menu. Three "buttons" below the menu bar are labelled Copy Text, Delete Text and Move Text. With the buttons, you can do a lot of editing without having to lay a finger on your keyboard.

The Display Menu

The Display menu contains commands to toggle blinking or solid cursors and to select color composite or monochrome monitors. What is most impressive about this package is that onscreen type size can be changed — from 58 to 212 characters per line!

This support for such a wide variety of onscreen type sizes is most unusual and unique in the CoCo world — with the exception of *TextPro*, another word processor from Cer-Comp. (*TextPro* may be more powerful than *Window Writer*, but it is also much more difficult to use and more suited to a programmer than a beginner or the average user.)

When type size is changed, the lines automatically readjust for display size. The display size commands, by the way, are for the screen only; they have no effect on printouts (standard printed default is 80 characters per line).

The Miscellaneous Menu

The Miscellaneous menu (or Misc. menu, as it's called onscreen) is the grab-bag gateway to macros, the default settings menu and the Status window. The Status window tells how much memory is free and used, and also reveals the cursor's current position in the file. Additionally, it offers word and line counts. (A Status Info button can be clicked for a shortcut.)

The pop-up Defaults box lets the user select the default disk drive, line length, margins, justification, spacing, etc. Even the cursor's auto-repeat rate can be set.

As for macros, what *Window Writer* calls *function keys*, you can program a key function, display key definitions and save a key set. Upon start-up *Window Writer* automatically saves the current function key set and loads a set of keys called `WORDKEYS.KEY`.

Also from the Miscellaneous menu are the Goto Page #, Kill Help File, Split Screen and Un-Split Screen commands. Goto Page # is pretty self-explanatory; if a document has been formatted, it moves you to a specified page — a fast way of getting around in a document. The Kill Help File option is provided for freeing up more space in the buffer for a text file by killing the Help file (if you think you can do without it). The Split Screen command divides the text screen into upper and lower halves, handy for when you want to edit one section of a file while viewing another.

The Printer Menu

From the Printer menu you can set baud rates from 300 to 19200 baud, and also toggle linefeeds. By default, linefeeds are disabled. When you click to enable linefeeds, it causes a normal CoCo printer to print in double spacing. Other options from the Printer menu include Print Screen and Print File.

The Style Menu

The Style menu lets you insert commands for plain, bold, italics, underlining, wide, superscripted and subscripted text into your document. I found it very handy to be able to click on a style when I wanted to go to italics, but as the manual points out, resorting to the Style menu does get to be slow — when you become familiar with *Window Writer*, it becomes just as easy and a lot faster to type the commands yourself. The function keys really help out with this.

OS9 = File = Utilities = Games = Hardware = BASIC = Support

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The Format Menu

The Format menu is used to "text-process" your document for output to the printer, the disk or the screen. Options include Start Text Process, Format to Printer, Format to Disk and Format to Screen.

When you're typing along in the editor, you'll notice codes for such things as italics and bold. You do not get a WYSIWYG view until you format the text — then bold text appears as bold onscreen, italics as italics, etc. Embedded commands are usually inserted at the beginning of each text line (although certain commands can be placed in the middle). They begin with a period (.) and are followed by a two-letter mnemonic code, such as `.CE` for centering text. This text formatting is the most difficult part of learning to use *Window Writer*, and even this is not so difficult once you read over the text formatting section of the manual.

At first, embedding all these codes may seem kludgy when compared to the point-and-click ease of use in the rest of the program, but soon you realize the power available in such a system. Besides, macros can be designed to automate the process of embedding commands. Codes are available for margins, line/page lengths, pagination, headers/footers, footnotes, fonts, character fills, tabs, field records, tables of contents, programmable printer control functions, spacing and much, much more. There are even nine user-programmable functions.

Window Writer allows a great deal of flexibility when using different font modes, but care must be exercised. You must always use a left margin of 0 or you will get varied results when centering or using column formatting. This is because the dot width of a space character is usually different from font to font, and the left margin is printed in the last font used at print time. Therefore, you will be better off if you use your printer's commands to set the left margin. (Although many printers are already supported and appropriate files are on the supplied disk, you may want to consult your own printer manual to take advantage of all it has to offer. Once you have your printer file on disk, you can have it imported during boot-up.)

Wrapping Up

"Smooth" is the way I'd describe *Window Writer*'s point-and-shoot technique. I was impressed with the operation and speed of *Window Writer*. It capitalizes on the WYSIWYG idea so that you always know exactly what your document is going to look like. The 50-page spiral-bound instruction book is full of helpful hints and illustrations.

The shortcut buttons are an ingenious feature that saved me a lot of time. The buttons I found I used most were the Delete Text, Move Text, Copy Text, Find Next, Change Next, Del Word and Undo Line buttons. The buttons are just one example of the thought and planning that went into this program.

Window Writer is a powerful word processor that is fun to use, very user-friendly and has a price tag that represents an outstanding value. The environment compares favorably to that of Microsoft *Windows* under MS-DOS.

I wish someone would figure out how to add a good spelling checker to this package. And I also wish there were some way to shoehorn this excellent program into a 128K machine. For you 512K CoCo 3 owners, *Window Writer* is a must-have program. Don't pass it up.

(Cer-Comp Ltd., 5566 Ricochet Ave., Las Vegas, NV 89110, 702-452-0632; $59.95, $79.95 for *Window Master/W* runtime version)

—Robert Gray

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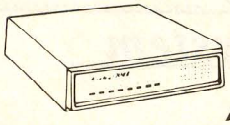

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Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

Airwar Plus, a collection of three arcade-style aerial combat games: *Airwar*, *Airwar2* and *Spacewar*. Requires a CoCo 3, a disk drive and a joystick. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $15.*

◈ **C.R.T. Connection Public Domain Collection**, a set of 97 disks in six categories: utilities, music, graphics, education, games and telecommunications. A sampling sent for review includes jokes and insults disks, games (*Caves of Xlaxx*), a label program, and files for the Speech/Sound pack. *C.R.T. Connection, 3625 Orange Ave., Ft. Pierce, FL 34947, (407) 464-9873; $3.50 per single disk, $194 for the 97-disk set.*

DSKLBL Version 1.1, a menu-driven program written in BASIC, designed to print disk directories on labels, jacket inserts and custom disk jackets. Requires a 32K CoCo with Extended BASIC, a disk drive and a printer. *King Cottage Industries, 1814 Valley St. N.E., Poulsbo, WA 98370, (206) 697-5576; $5.*

Eagle Keyboard and Adapter, a keyboard/adapter unit that lets CoCoists use a 105-key Eagle-compatible keyboard with CoCos 1, 2 or 3. The unit fits inside the CoCo and requires opening the computer. It offers compatibility with the built-in CoCo keyboard while allowing use of function keys, a numeric keypad and macros. Includes a 6-foot cord. *Arizona Small Computer, 930 W. 23rd St., Suite 26, Tempe, AZ 85282, (602) 829-8028; $125.*

Eldus, an arcade-style adventure game featuring 101 graphics screens. The object of the game is for the player, as King Ralum, to explore the multi-tiered world of Barthen and find Eldus, the pool of life. Requires a CoCo 3 with disk. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $16.*

HAWKSoft Dual Hi-Res Joystick Adapter, an adapter that allows the use of programs that require the Tandy Hi-Res joystick adapter or the Colorware adapter, as well as programs that require no joystick adapter at all; dual toggles set the modes. Includes a cassette port. *HAWKSoft, P.O. Box 7112, Elgin, IL 60121, (312) 742-3084; $40.*

KJV on Disk #3, the book of Exodus 1-21 on disk in ASCII files for CoCos 1, 2 and 3. *BDS Software, P.O. Box 485, Glenview, IL 60025, (312) 998-1565; $3.*

◈ **M-Menuing System**, an OS-9 machine-language version of the *R-Menu* system written in C for UNIX. For CoCo 3s and OS-9 Level II. *r³ Systems, 4072 E. 22nd St., Suite 178, Tucson, AZ 85711, (602) 745-2327; $19.95 plus $3 S/H.*

Rorke's Drift, a strategic war game based on the battle between the British and Zulu forces in Africa in 1879. The player controls the British forces; the object is to stay alive until the troops' relief column arrives. For the Color Computer 3 with a disk drive system. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $16.*

◈ **S-Screen Control Utility**, a 509-byte machine language program designed to be merged with OS-9's `shell`. It offers 37 mnemonic commands for text screen control, and also includes the small machine language program *S09*, a BASIC09 interface that allows users to call *S* from within a BASIC09 program. For CoCo 3s and OS-9 Level II. *r³ Systems, 4072 E. 22nd St., Suite 178, Tucson, AZ 85711, (602) 745-2327; $19.95 plus $3 S/H.*

Simply Better 2.0, an upgraded word processor for the CoCo 3. New features include word counts, repeat-last and invert-case commands, and a Cray-o-lator (a pop-up floating-point calculator for decimal, binary and Hex). Also, old commands have been modified to use mnemonic keystrokes (e.g., ALT-CTRL-M for mail merge). Version 2.0 also includes a French supplement, a condensed version of the manual written in French, which also shows how to generate French characters. *Simply Better Software, P.O. Box 20726, Portland, OR 97220, (503) 254-7225; $34.95, or $29.95 through Dec. 15, add $3 S/H.*

◈ **Utilities/Subroutines for BASIC**, a set of subroutines, utilities and programming aids for Disk BASIC programmers. Includes *QuickDraw*, an interactive drawing program for `PMODE 4`, a search-and-replace utility for data files, an electronic notepad, programming and scientific calculator programs, and more. Requires a 128K CoCo 3 and Disk BASIC. *Gibralter Software, 65 Bluff Ave., Rowayton, CT 06853, (203) 335-0581; $14.95 plus $2 S/H.*

◈ **First product received from this company**

The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

—Lauren Willoughby

They call it Flipper

Flipper09

by Stephen J. Page

Most people have heard of the games like *Flipper09*. Many have played the game in one form or another. Some may even have tried to program it on their computer. The object is to have more pieces on the board with your color than your opponent by the end of the game. This is done by placing one of your pieces in an unoccupied square so that one or more of your opponent's pieces are in between the piece you put down and the pieces you already have on the board. The pieces of your opponent between your two pieces are turned to show your color. This may sound complicated, but it is really very simple, especially when done on the computer.

Drawing the board in BASIC, as well as making moves indicated by two human players, is simple. The real difficulty comes when you want the computer to play — speed is a problem. With Extended Color BASIC, to get any realistic playing capability takes about two minutes per move. This is why I chose to write *Flipper09* in BASIC09.

Stephen J. Page, a 23-year-old mechanical engineer, works for Bristol Aerospace Limited, in Ottawa, Ontario, Canada. He has been using a CoCo for over four years and has written a large number of games, practical programs and utilities for his Color Computer. He can be reached at 331 Elmhurst Road, Winnipeg, MB, Canada R3R 0T6; (204) 775-8331, ext. 3175.

OS-9

The listing: Flipper09

```
PROCEDURE Flipper09
 0000       DIM sum4,sum2,sum1,sum3,col1,col2,total:INTEGER
 001F       DIM move,line,ll,player,xx,yy,cnter,errnum:INTEGER
 0042       DIM x0,y0,dx,dy,x1,y1,x2,y2,x3,y3,tb:INTEGER
 0071       DIM scor(3),xa(20),ya(20),aa(10,10):BYTE
 009C       DIM va(10,10):INTEGER
 00AC       DIM name(3):STRING
 00B8       DIM edge,str,nm(3):STRING[1]
 00D1       DIM board,left:STRING[2]
 00E1       DIM note:STRING[37]
 00ED       DIM bottom:STRING[17]
 00F9       DIM nout,blank:STRING[6]
 0109       DIM nogo,good,point:BOOLEAN
 0118 5     line=5
 0122       PRINT CHR$(12)
 0127       PRINT TAB(12); "OTHELL09"
 0137       PRINT TAB(9); "COPYRIGHT 1985"
 014D       PRINT TAB(7); "BY STEPHEN J. PAGE"
 0167       PRINT TAB(9); "OTTAWA, CANADA"
 017D       PRINT
 017F       left=CHR$(2)+CHR$(32)
 018B       note=left+CHR$(45)+"                                          "+left+CHR$(45)
 01C1       blank="   "+CHR$(8)+CHR$(8)+CHR$(8)
 01D7       ON ERROR GOTO 60
 01DD       nogo=FALSE
 01E3       BASE 0
 01E5       INPUT "FIRST PLAYERS NAME: ",name(1)
 0204       INPUT "SECOND PLAYERS NAME: ",name(2)
 0224       IF name(1)="" THEN name(1)="COCO"
 023F       ENDIF
 0241       IF name(2)="" THEN name(2)="coco"
 025C       ENDIF
 025E       PRINT "COLOR DISPLAY? (Y/N) ";
 0278       GET #0,str
 0281       PRINT
 0283       IF str="Y" OR str="y" THEN
 0298         FOR x0=1 TO 4
 02A8           PRINT "  "; x0; ":";
 02B7           str=CHR$(127+16*x0)
 02C6           PUT #0,str
 02CF         NEXT x0
 02DA         PRINT
 02DC 10      line=10
 02E6         REPEAT
 02E8           PRINT left+CHR$(43)+"FIRST COLOR:";
 0301           GET #3,str
 030A           col1=VAL(str)
 0314         UNTIL col1<5 AND col1>0
 0326 20      line=20
 0330         REPEAT
 0332           PRINT left+CHR$(44)+"SECOND COLOR:";
 034C           GET #0,str
```

```
0355          col2=VAL(str)
035F        UNTIL col2<5 AND col2>0 AND col1<>col2
0379        PRINT
037B        edge=CHR$(128)
0383        bottom=""
038A        FOR x0=1 TO 17
039A          bottom=bottom+CHR$(195)
03A6        NEXT x0
03B1        nm(0)=CHR$(195)
03BC        nm(1)=CHR$(115+16*col1)
03CE        nm(2)=CHR$(115+16*col2)
03E0      ELSE
03E4        edge=" "
03EC        nm(0)="+"
03F7        nm(1)=name(1)
0404        nm(2)=name(2)
0411      ENDIF
0413      REPEAT
0415        REM INITIALIZE ARRAY
0428        FOR x0=0 TO 9
0438          FOR y0=0 TO 9
0448            aa(x0,y0)=0
0456          NEXT y0
0461        NEXT x0
046C        aa(4,4)=1
0478        aa(5,5)=1
0484        aa(4,5)=2
0490        aa(5,4)=2
049C        FOR x0=1 TO 4
04AC          FOR y0=1 TO 4
04BC            READ nn
04C1            va(x0,y0)=nn
04D1            va(x0,9-y0)=nn
04E4            va(9-x0,y0)=nn
04F7            va(9-x0,9-y0)=nn
050D          NEXT y0
0518        NEXT x0
0523        DATA 2000,-100,50,40
0535        DATA -100,-250,-21,-15
0549        DATA 50,-21,5,2
055A        DATA 40,-15,2,1
056B        REM PRINT OUT BOARD
057D        tb=8
0584        PRINT CHR$(12); TAB(tb); "   1 2 3 4 5 6 7 8"
05A3        FOR x0=1 TO 8
05B3          PRINT TAB(tb); x0;
05BE          str=edge
05C6          PUT #0,str
05CF          FOR y0=1 TO 8
05DF            board=nm(aa(x0,y0))+edge
05F4            PUT #0,board
05FD          NEXT y0
0608          PRINT x0
060D        NEXT x0
0618        IF line=20 THEN PRINT TAB(tb+1);
062D          PUT #0,bottom
0636          PRINT
0638        ENDIF
063A        PRINT TAB(tb); "  1 2 3 4 5 6 7 8"
0654        PRINT left; CHR$(47); "ENTER 0,0 IF UNABLE TO MOVE";
067C        FOR x0=1 TO LEN(name(1))
0690          nout=CHR$(2)+CHR$(34)+CHR$(x0+31)+nm(1)+MID$(name(1),x0,1)+nm(1)
06BC          PUT #0,nout
06C5        NEXT x0
06D0        FOR x0=1 TO LEN(name(2))
06E4          nout=CHR$(2)+CHR$(60)+CHR$(x0+31)+nm(2)+MID$(name(2),x0,1)+nm(2)
0710          PUT #0,nout
0719        NEXT x0
0724        player=1
072B        move=4
0732        WHILE move<64 DO
073E          line=30
0745 30       REM prompt for move
075A        PRINT left; CHR$(42+player); name(player); "'S MOVE (X,Y):"; blank:
0784          IF name(player)="COCO" OR name(player)="coco" THEN
07A5            GOSUB 70
07A9          ELSE
07AD            GET #0,str
07B6            xx=VAL(str)
07C0            PRINT ",";
07C6            GET #0,str
07CF            yy=VAL(str)
07D9          ENDIF
07DB          IF xx=0 AND yy=0 THEN
07EE            IF nogo THEN 40
07FA            PRINT note; name(player); " CAN'T GO"
0812            nogo=TRUE
0818            player=3-player
0823            GOTO 30
0827          ENDIF
0829          IF aa(xx,yy)=0 THEN point=FALSE
0840          ELSE PRINT note; "POSITION TAKEN"
0859            GOTO 30
```

BASIC09 is much faster than Extended Color BASIC and can handle more variable types.

The program is designed so two people can play, or one person can play against the computer — the computer can even play against itself. The program starts by asking you the name of the first player. Simply type in your name and press ENTER. If you press ENTER without a name, the computer plays for the first player. The computer then prompts you for the name of the second player. Again, if you press ENTER without a name, the computer decides the moves for the second player.

If you press ENTER at both prompts, the computer plays itself. Next the program asks if you are using a color TV. The game was originally designed for a color TV, where the players' pieces are shown in color. However, I realized that not everyone has a color TV, so I added a routine for a black and white TV or monitor. If you select color by pressing Y, you are asked for the colors of the pieces of the first and second players. Just enter the number corresponding to the color shown. If you selected black and white by pressing any key except Y, the pieces are represented by the first letter of each player's name. Note: In this mode do not input first and second players' names that have the same first letter because it's impossible to distinguish between players' pieces.

Now you are ready to play. All you have to do is indicate the position of your move by pressing two numbers on the keyboard; first the *x* position (1-8), which is across the screen, then the *y* position (1-8), which is down the screen. The program makes sure the move is legal, then makes the move and

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prompts the next player to move. If the computer is required to move, it does so in an average of nine seconds. If a player is unable to make a legal move by not being able to turn over at least one of the opponent's pieces, that player must forfeit the move by entering 0,0 as the *x* and *y* coordinates. The game ends either when all the spaces are filled or neither player can make a move, at which time the score is calculated and the players are offered another game.

While writing this program, I had to decide whether to have a really fast game with an unintellectual computer player or a fairly long game with a competent computer player. Because of BASIC09's capabilities, I was able to reach a compromise — the game is fast and the level of play is challenging.

Due to time limitations the computer is only able to look two moves ahead: its move and its opponent's next move. That is, the computer checks every possible space on the board to see if it can move there. If it can, it does (remembering each piece it turns over). Then it looks at each possible move its opponent can make, determines the best one, then calculates a score of its own move based on the worst case outcome. The computer then returns the board to its original state and searches for another move. This continues until the computer has looked at and scored all possible moves. It then looks at all the scores and makes the move with the best score. The score is not simply based on the number of pieces turned over, but rather on the values of the pieces lost or gained — with each position assigned a value based on its importance. ❑

Two-Liner Contest Winner . . .

Grab the rope, plant your feet and get ready for a game of *Tug of War*. Two players battle it out by pressing the A and L keys, respectively. Winning is accomplished by pulling your opponent into the mud pit.

The listing:

```
10 PMODE0,1:PCLS5:SCREEN1,1:DRAW
"C0BM0,100R254BM118,102R20G2L16"
:P$(0)="C0D2C5D2C0D6NF4U6R60D6F2
D2BL4U2E2U8C5U2C0U2C5U":P$(1)="C
0D2C5D2C0D6F2D2BL4U2E2U6R60D6NG4
U8C5U2C0U2C5U":PCOPY1TO2:PCOPY1T
O3:A=98:D(1)=-1:D(2)=1:DRAW"BM98
,84:"+P$(0):SOUND100,20
20 EXEC44539:I$=INKEY$:M=INSTR("
AL",I$):IFM=0THEN20ELSEA=A+D(M):
PMODE0,2:DRAW"BM=A;,84"+P$(I):I=
1-I:PCOPY2TO1:PCOPY3TO2:IFA=820R
A=115THENPLAY"V31T4L4O3GO4CL3EL4
CE":CLS:PRINT"PLAYER"I+1"WINS!":
END ELSE GOTO 20
```

Arron Becwar
Mt. Sterling, Wisconsin

(For this winning two-liner contest entry, the author has been sent copies of both *The Fourth Rainbow Book of Adventures* and its companion *The Fourth Rainbow Adventure Tape*.)

```
085D          ENDIF
085F          FOR dx=-1 TO 1
0870            FOR dy=-1 TO 1
0881              IF aa(xx+dx,yy+dy)=3-player THEN
089F                x1=xx+dx
08AB                y1=yy+dy
08B7                11=0
08BE                REPEAT
08C0                  x1=x1+dx
08CC                  y1=y1+dy
08D8                  11=11+1
08E3                UNTIL aa(x1,y1)<>3-player
08F8                IF aa(x1,y1)=player THEN point=TRUE
0910                  REPEAT
0912                    x1=x1-dx
091E                    y1=y1-dy
092A                    11=11-1
0935                    GOSUB 50
0939                  UNTIL 11=0
0944                ENDIF
0946              ENDIF
0948            NEXT dy
0953          NEXT dx
095E          IF NOT(point) THEN PRINT note; "MOVE GETS NO POINTS!"
0983            GOTO 30
0987          ELSE
098B            x1=xx
0993            y1=yy
099B            GOSUB 50
099F            PRINT note; " "
09A8            nogo=FALSE
09AE            move=move+1
09B9            player=3-player
09C4            IF move=60 THEN
09D0              FOR x0=1 TO 8
09E0                FOR y0=1 TO 8
09F0                  va(x0,y0)=10
09FE                NEXT y0
0A09              NEXT x0
0A14            ENDIF
0A16            IF x1=1 OR x1=8 THEN
0A29              IF y1=1 OR y1=8 THEN
0A3C                va(x1,y1-1)=500
0A4E                va(x1,y1+1)=500
0A60              ELSE
0A64                va(x1,y1-1)=va(x1,y1-1)+100
0A82                va(x1,y1+1)=va(x1,y1+1)+200
0AA0              ENDIF
0AA2            ENDIF
0AA4            IF y1=1 OR y1=8 THEN
0AB7              IF x1=1 OR x1=8 THEN
0ACA                va(x1-1,y1)=500
0ADC                va(x1+1,y1)=500
0AEE              ELSE
0AF2                va(x1-1,y1)=va(x1-1,y1)+200
0B10                va(x1+1,y1)=va(x1+1,y1)+100
0B2E              ENDIF
0B30            ENDIF
0B32          ENDIF
0B34        ENDWHILE
0B38 40     REM CALCULATE SCORE
0B4D        scor(1)=0
0B57        scor(2)=0
0B61        FOR x0=1 TO 8
0B71          FOR y0=1 TO 8
0B81            scor(aa(x0,y0))=scor(aa(x0,y0))+1
0B9F          NEXT y0
0BAA        NEXT x0
0BB5        PRINT note; name(1); " WON "; scor(1); ", "; name(2); " WON "; scor(2)
0BE7        PRINT "DO YOU WANT ANOTHER GAME? ";
0C06        GET #0,str
0C0F        PRINT
0C11      UNTIL str="n" OR str="N"
0C25      END
0C27 50   REM TURN ON BOARD POSITION X1,Y1
0C49      PRINT CHR$(2); CHR$(x1*2+tb+31); CHR$(y1+32);
0C66      str=nm(player)
0C71      PUT #0,str
0C7A      aa(x1,y1)=player
0C89      RETURN
0C8B 60   REM ERROR ROUTINE
0C9E      errnum=ERR
0CA4      IF errnum=2 OR errnum=3 OR errnum=211 THEN
0CBE        IF errnum=2 OR errnum=3 THEN GET #0,str
0CD9        ENDIF
0CDB        PRINT note; "DO YOU REALLY WANT TO QUIT?";
0CFF        GET #0,str
0D08        IF str="y" OR str="Y" THEN 40
0D20        PRINT note; "WELL DON'T PUSH THAT KEY THEN"
0D45        GOTO 65
0D49      ENDIF
0D4B      IF errnum=55 THEN PRINT note; "X OR Y IS OUT OF RANGE"
0D74        GOTO 30
```

```
ØD78        ENDIF
ØD7A        IF errnum=67 THEN PRINT note; "INPUT NUMBERS ONLY!"
ØDAØ          GOTO 65
ØDA4        ENDIF
ØDA6        PRINT note; "ERROR NUMBER "; errnum
ØDBF 65     REM RETURN FROM ERROR
ØDD6        IF line=5 THEN 5
ØDE5        IF line=1Ø THEN 1Ø
ØDF4        IF line=2Ø THEN 2Ø
ØE03        GOTO 3Ø
ØE07 7Ø     REM COMPUTER MOVES
ØE1B        total=-1ØØØØ
ØE23        xx=Ø
ØE2A        yy=Ø
ØE31        FOR x1=1 TO 8
ØE41          FOR y1=1 TO 8
ØE51            IF aa(x1,y1)=Ø THEN cnter=Ø
ØE69              sum1=va(x1,y1)
ØE77              FOR dx=-1 TO 1
ØE88                FOR dy=-1 TO 1
ØE99                  IF aa(x1+dx,y1+dy)=3-player THEN
ØEB7                    x2=x1+dx
ØEC3                    y2=y1+dy
ØECF                    11=Ø
ØED6                    REPEAT
ØED8                      x2=x2+dx
ØEE4                      y2=y2+dy
ØEFØ                      11=11+1
ØEFB                    UNTIL aa(x2,y2)<>3-player
ØF1Ø                    IF aa(x2,y2)=player THEN
ØF23                      REPEAT
ØF25                        x2=x2-dx
ØF31                        y2=y2-dy
ØF3D                        sum1=sum1+va(x2,y2)*2
ØF52                        cnter=cnter+1
ØF5D                        xa(cnter)=x2
ØF69                        ya(cnter)=y2
ØF75                        11=11-1
ØF8Ø                        aa(x2,y2)=player
ØF8F                      UNTIL 11=Ø
ØF9A                    ENDIF
ØF9C                  ENDIF
ØF9E                NEXT dy
ØFA9              NEXT dx
ØFB4              IF cnter>Ø THEN
ØFCØ                aa(x1,y1)=player
ØFCF                sum2=-1ØØØØ
ØFD7                FOR x2=1 TO 8
ØFE7                  FOR y2=1 TO 8
ØFF7                    IF aa(x2,y2)=Ø THEN sum4=va(x2,y2)
1Ø16                      good=FALSE
1Ø1C                      FOR dx=-1 TO 1
1Ø2D                        FOR dy=-1 TO 1
1Ø3E                          IF aa(x2+dx,y2+dy)=player THEN
1Ø59                            x3=x2+dx
1Ø65                            y3=y2+dy
1Ø71                            sum3=Ø
1Ø78                            REPEAT
1Ø7A                              sum3=sum3+2*va(x3,y3)
1Ø8F                              x3=x3+dx
1Ø9B                              y3=y3+dy
1ØA7                            UNTIL aa(x3,y3)<>player
1ØB9                            IF aa(x3,y3)=3-player THEN
1ØCF                              sum4=sum4+sum3
1ØDB                              good=TRUE
1ØE1                            ENDIF
1ØE3                          ENDIF
1ØE5                        NEXT dy
1ØFØ                      NEXT dx
1ØFB                      IF good THEN
11Ø4                        IF sum4>sum2 THEN sum2=sum4
1118                        ENDIF
111A                      ENDIF
111C                    ENDIF
111E                  NEXT y2
1129                NEXT x2
1134                REM COMPARE SCORE TO TOTAL
114D                IF sum1-sum2>total THEN
115E                  total=sum1-sum2
116A                  xx=x1
1172                  yy=y1
117A                ENDIF
117C                WHILE cnter>Ø DO
1188                  aa(xa(cnter),ya(cnter))=3-player
11AØ                  cnter=cnter-1
11AB                ENDWHILE
11AF                aa(x1,y1)=Ø
11BD              ENDIF
11BF            ENDIF
11C1          NEXT y1
11CC        NEXT x1
11D7        PRINT xx; ","; yy
11E4        RETURN
```


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See: Review - December Rainbow.
Dale Puckett - November Rainbow.

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OS-9 Takes Bean Town

by Dale L.Puckett
Contributing Editor

Another decade draws to a close this month. Changing calendars gives us cause to pause and reflect on the recent past as we search for developing trends — and celebrate accomplishments. We look forward to the future as we seek answers to lingering questions. Where is OS-9 headed? What does the crystal ball hold in store for our favorite operating system as we move toward the turn of the century?

Kevin Darling Bullish on OS-9's Future

Kevin Darling, the OS-9 Users Group president, had just returned from BusCon in Boston when I asked him where he thought OS-9 was headed. He was bullish, and with good reason — OS-9 made a big splash in Bean Town at this large gathering of Motorola and VME-bus companies.

"Six months ago I really didn't hold much hope," Darling said. "I told a few of my friends last summer that we were destined to be married to the world of control system operators and hobbyists forever. I didn't expect OS-9 would ever become a mainstream operating system. We would continue to be an underground classic."

Dale L. Puckett, a freelance writer and programmer, serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. His username on Delphi is DALEP: on packet-radio, KOHYD @ N4QQ; on GEnie, D.PUCKETT2; and on CIS, 71446,736.

But Darling changed his mind this fall. Why? "Because of OS-9000 Intel 80386-based and Motorola 68020-based systems, OS-9/68000 on the ST, Amiga, and Macintosh, and OS-9 running concurrently with MS-DOS on a card plugged into an IBM clone! These are just a few of the indications that OS-9 may break into the open," Darling said. "Very high interest in OS-9 has been evident at several major trade shows. Many MS-DOS companies are asking me a lot of questions.

"Software companies need standards transported across many machines," Darling said. "UNIX is too big. OS/2 is too big and a mishmash — it has everything thrown in but the kitchen sink. But most importantly, many software companies now know that OS-9 works well. When you look at all these events and reactions together, you begin to get excited about OS-9 moving into the mainstream. With the addition of OS-9000, a portable version of OS-9 that works across many computing platforms, all we're lacking is a standard graphics interface and a better price."

Darling noted that he may just write that standard graphics interface. He's tired of waiting. He stressed that we should not get discouraged because there are only a few new OS-9 products in the 1990 Tandy Catalog. "I don't feel the present drought of new products indicates a lack of interest in Fort Worth," Darling said. "I just think it takes time for a large company to plan and develop a broad and comprehensive product line."

Darling worries that those who complain too loud before doing the proper homework are making it harder for the Color Computer community to move forward. He feels that many promising third-party hardware and software developers are being driven out of the market.

"Most of the developers take phone calls all the time," Darling said. "They create new products out of their love for the Color Computer and OS-9. They put in a full day at work like the rest of us, then come home at night and work half the night soldering circuit boards in the basement. They're not getting rich. In fact, they're probably barely turning a profit. Yet, they believe in their product and take almost all calls — calls that return very few dollars and keep them from their families for hours.

"What really gets my goat is that the people who have a problem with a product struggle on their own for a while and then start complaining in a public forum that XYZ doesn't work for them," Darling said. "Most of the time they haven't taken the time to call the author or manufacturer. Unfortunately, many potential new authors and manufacturers — and many existing entrepreneurs — read these complaints on the forums and come to believe that it just isn't worth the hassle."

OS-9000 for the 1990s

What is OS-9000? Does it look like the OS-9 we've grown to love on the Color Computer? Many people on CompuServe's OS-9 SIG answer, "a portable OS-9" and "yes." They also like what they see.

Normal OS-9 system calls are present and accounted for as are several new calls that let you set the priority of the various

processes. The new release also lets you store the modules you have loaded into memory into module directories. This means several people can test and use modules with the same name on the same machine, without confusing each other. New commands include an `MDir` with directory names (`mdir mymodules`), as well as `makmdir` and `delmdir` commands.

I/O operations with the new OS-9 are much faster because interrupt-driven SCF devices don't use the read/write driver entries. Rather, they share a common buffer with the driver's IRQ routines. This speeds up serial transfers dramatically. Originally OS-9 moved just one byte at a time between the SCF file manager and driver.

OS-9000 line editing is more advanced too. It emulates the SCF patch for OS-9 Level II on the Color Computer 3, which Kevin Darling uploaded to both the CompuServe and Delphi OS-9 SIGs several years ago. It's about time! The non-CoCo OS-9 world has missed and needed this feature. RBF bit map sectors have also been broken up and placed closer to the rest of the files, speeding up disk access. And there's no longer a file descriptor segment count limit.

Overall, OS-9000 was a big hit in Boston. It was the first time the non-Motorola crowd had the chance to exercise OS-9. That's good news for those who have worked with OS-9 on the Color Computer during its long underground history. In the words of Mark Griffith, a prolific and talented OS-9 programmer, "It looks like all these years of mucking about with OS-9 might finally pay off for us die-hards. Imagine what it might be like in a year or two if the whole computer world decides it wants OS-9 and demands OS-9 expertise? We can all name our price."

Then there's the $64,000 question everyone is asking on the SIGs. Will Tandy offer OS-9000 for its 386 systems now? If the answer to this question is yes, it will be a real boon for OS-9 programmers who want to move into any of the many vertical software market opportunities in the world of the IBM clones.

The down side of the equation is that there will most likely never be a port for the less powerful Intel 80286 systems — bad news because these machines have finally come down in price to the point where regular users can almost afford them. However, if we wait long enough, maybe the price of the 386 systems will come down to where the 286s are today. After all, I just saw an article in *Byte* heralding the first 486 system.

It will be very interesting to see how Microware deals with the different levels of 386 hardware on the market. There's no way to count the video, disk, keyboard, serial and printer differences it'll run into before OS-9000 matures. In any case, our fraternity has taken another giant step in the right direction. Stay tuned!

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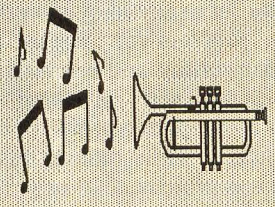

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of the older GIME chips and have recently installed one of the fantastic Disto 4-in-1 disk controllers from CRC, you may have noticed that your printer has developed a case of the hiccups. If your parallel port appears to send random linefeeds under OS-9 while you're not using the printer, we have the fix direct from Tony DiStefano.

- On the solder side of the circuit board cut the trace that goes to Pin 2 of the 74HC123 (74HCTLS123).
- Solder a jumper from Pin 2 of the 74HC123 to Pin 9 of the 74HC157 (74HCTLS157).

That's it. If you would rather not perform this surgery yourself, contact CRC Disto for details about having it done at the factory.

Bug Fixes from Burke and Burke

Chris Burke does an outstanding job when it comes to supporting his Color Computer hardware and software products. For example, he often provides us with the solutions to common problems so we can let you know. He is also very good about posting this information on the electronic SIGs.

Many of the problems only affect people with hybrid systems, but that includes most of us in this community. For instance, if you are using Burke's new Repack utility and format your hard disk drive with D.P. Johnson's format utility, it may set the cluster size to something other than 1. As stated in the manual, Repack does not work on drives that have DD.BIT in the device descriptor set to anything other than 1. To solve this problem you must use a file-by-file backup utility and reformat the hard drive with the Tandy format utility.

Chris also reported problems caused by media defects while running his CCheck, HDB and HDR utilities. Call or write him to find out about a new release of these programs that promises to solve the problem.

If you purchase a copy of *RSB Version 1.3* that displays a 1988 copyright message at startup, you'll discover that the HDRAW command doesn't work right. Call or write Chris to request the latest version, and Burke & Burke will send you the 1989 version free of charge. In the new version you'll also notice the tones generated by the PLAY command are a bit more accurate.

Here's a tip that applies to OS-9 utility commands from just about every manufacturer (if you are using the new *Shell+* from the OS-9 Users Group. If you're not, you owe it to your sanity to download it from CompuServe, Delphi or order it from the OS-9 Users Group): You must disable Shell+'s wildcard enhancement by issuing a -V command prior to using HDir, HCopy or HDel. Chris mentions this in his documentation, but many people have missed it.

Burke also wants to make sure users know that when you use OS9ify, a utility that makes a floppy disk readable by both BASIC and the OS-9 HCopy utilities, the program does not create an OS-9 directory on the floppy, nor is it used to transfer files between BASIC and OS-9. First you must use OS9ify from BASIC. Then you can use HCopy from OS-9. Don't forget you must use different disks for the source and destination if the source disk was created by OS9ify.

Common Problems

While I was talking to Kevin Darling about OS-9000, we discussed some of the common problems that people are running into with their CoCo Level II systems. He suggested I take a little space to review a few of the many solutions and tips I have passed along in earlier columns. Good idea. Following a quick review of the SIGs, I decided installing and starting GShell, the Boot Failed Error, out of memory errors while running BASIC09, and using Control to wake up your mouse would make good topics for this month.

If you have a short attention span while looking over a listing of the install procedures that come with the *Multi-Vue* distribution disk from Tandy, you may become overwhelmed. But if you stop to think about it, it's really not that hard to install *Multi-Vue*.

In the words of one SIG member, "I just put the commands in the CMDS directory, edited env.file and went from there." Since this solution is a bit too simplified, let's recap.

Before you copy the commands to the CMDS directory, etc., you *must* make one step toward mouse-based computing. You must remove the GrfInt module from your OS9Boot file and replace it with WindInt. This is the OS-9 module that supports the mouse and windows.

The operative word above is *your*. I say this because *your* OS9Boot file has most likely already been customized to match your hardware and computing preferences. And if you have already customized your OS9Boot file, you probably still have the bootlist file that you used to manufacturer your custom system. If so, you need only edit this file and run OS9Gen again to make your new *Multi-Vue* boot disk.

After you delete the GrfInt module from your bootlist file and add WindInt, you must also add the other modules in the MODULES directory from the original *Multi-Vue* disk. Needed modules include the device descriptors for /w and the additional device windows /w8 through /w15 that weren't available in the original OS-9 Level II release.

After running OS9Gen you must create a CMDS directory on your boot disk and copy the Shell and GrfDrv files into it. If this directory and these two files are not present, you will soon be reading the dreaded Boot Failed Error message.

If you are running a hard disk system, OS-9 loads Shell from your boot disk and links to it. It also loads GrfDrv into memory. It then makes the device /h0 the current data directory, and the directory /h0/CMDS the current execution directory. This switches control to the hard disk and you're off and running.

If you use the hard disk exclusively, you

```
00021 MENU 1,0,1,"Files" : REM OPEN NEW MENU
00022 MENU 1,1,1,"OPEN EDIT FIELD;CLOSE EDIT FIELD;CLS;QUIT.../Q;BUTTON;CURSOR"
00023 MENU 4,0,1,"OFF":MENU 4,1,1,"1;2;3;4;5;6"
00024 MENU 5,0,1,"ON":MENU 5,1,1,"1;2;3;4;5;6"
00025 MENU 6,0,1,"OUTPUT":MENU 6,1,1,"1;2;3;4;5;6"
00026                          MENU                          7,0,1,"TYPE":MENU
7,1,1,"1;2;3;4;5;6;7;8;9;10;11;12;13;14;15;16;17;18;19;20"
00027 EDIT MENU 2 : REM ENABLE EIT MENU
00028 MENU 3,0,1,"Cursor":MENU 3,1,1,"Arrow;Ibeam;Cross;Plus;Watch"
00029 '
00030 ON BREAK     GOSUB "BREAK EVENT"
00031 ON MENU      GOSUB "MENU EVENT"
00032 ON DIALOG    GOSUB "DIALOGEVENT"
00033 ON MOUSE     GOSUB "MOUSE EVENT"
00034 ON TIMER(3) GOSUB "TIMER EVENT"
00035 '00036 BREAK ON : DIALOG ON : MENU ON : TIMER ON : MOUSE ON
00037 DO
00038 UNTIL LOOP       '>>>>>> Main Event Loop!
00039 '
00040 BREAK OFF : DIALOG OFF : MENU OFF : TIMER OFF : MOUSE OFF
00041 STOP
```

Figure 1: Dream Code

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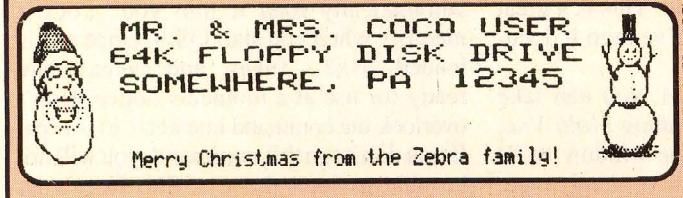

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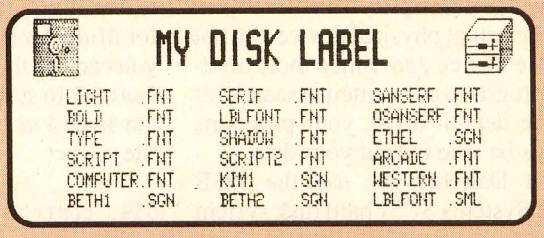

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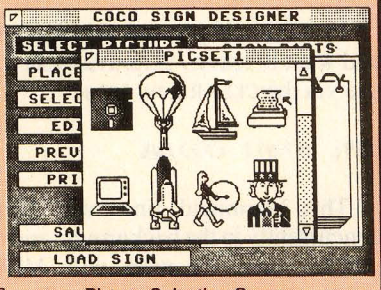
Read the review in May 89 Rainbow. CGDP Disk & 64 page typset manual. **$29.95**



Picture Selection Screen

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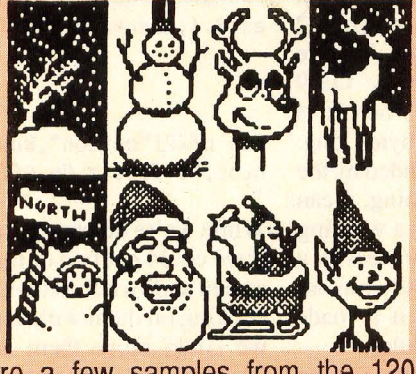

These are a few samples from the 120 Holiday Pictures on Picture Disk#4 for the CoCo Graphics Designer Plus and Label Designer. Merry Christmas!

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may want to edit the CC3Go module, using ModPatch to change the h0 to dd. Before you do this, ensure that you have installed a /ddh0 device descriptor. This descriptor points to the actual physical device /h0 but renames the device /dd. Since most modern OS-9 programs are written to search for files on the default drive, your programs will always be able to find your data.

Here at DaleSoft we use the RGB Computer Systems SCSI hard disk system and are able to boot directly from the hard disk. Because of this we also edited the Init module to tell OS-9 that the startup device is named /dd instead of /h0. Nice touch.

Back to GShell. First, get a copy of *IPatch* from the OS-9 Users Group, a local bulletin board system or one of the national networks like CompuServe, Delphi or Genie. This single effort will enhance your enjoyment of *Multi-Vue* 200 percent guaranteed! While you're at it, get Ron Lommardo's *Shell+*. You'll never regret it.

A recent letter from a reader reminded me that I use Shell+ exclusively. He took me to task and informed me that the command line below will not work if find is a packed BASIC09 program:

```
OS9: find max
```

He was right — if he was running the original Shell. In that case, the command should have read:

```
OS9: find ("max")
```

I never could stand to type those convoluted command lines with the parentheses followed by the quotes. After I installed *Shell+*, I never had to. So this reader was right and his letter made it particularly clear how dangerous it is for a writer to operate on the cutting edge of technology. It sure is fun though.

Let's move now to starting GShell. Tandy gives you a file named AutoEx. It is a copy of MultiStart, and if you have it in your CMDS directory when you start your Color Computer, *Multi-Vue* runs automatically. However, not everyone wants to run GShell at startup. And many don't like to use MultiStart since it's sort of a black box module, and they really don't know what it does. To find out, type:

```
OS9: gshell
```

In a few seconds you'll see a new screen and the familiar *Multi-Vue* icons pop in the new window. However, if you reach over to the mouse and try to move the mouse pointer, you'll notice that it refuses to move. The mouse hasn't been initialized. And that is one of the main reasons MultiStart exists. It initializes the mouse so it is ready for *Multi-Vue*.To get around the problem, you can use the *Multi-Vue* program named Control to start the mouse. Just before you run *Multi-Vue* (actually I put it in my startup file), type:

```
OS9: control -e.
```

This single line runs Control and causes it to read the file env.file in your SYS directory. This initializes your windowing system and mouse for you. This is a great trick, but the only place I've seen it documented is online.

After you run Control, you can take several approaches to running *Multi-Vue*. If you want the *Multi-Vue* window to be created in the place of /term, simply type:

```
OS9: gshell
```

However, if you are running GShell+ and want to leave /term available for your use via the CLEAR key, type:

```
OS9: gshell <>>>/w&
```

This command line runs *Multi-Vue* concurrently in the background and returns you to /term. To work with *Multi-Vue*, simply press the CLEAR key until you arrive in the *Multi-Vue* window.

A common problem may pop up while you're programming in BASIC09. It's a nice language and you're probably becoming quite prolific. Your program is singing, running with 32K of workspace. Then all of a sudden the program outgrows the workspace, and you decide its time to pack a few of the finished modules while you finish the source code. Enter Error 43 or Error 32 — both caused by memory errors. You've accidently discovered that every OS-9 module uses 8K of memory when it is loaded — even if it is only 16 bytes long. This design problem is compounded by the fact that when a process is running, it can only use 64K of memory. Thus a working process (remember an OS-9 process is a program that is running) can easily run out of the memory allocated to it if it loads more that two or three 8K modules.

There are several ways to approach the problem. First you can make sure your BASIC09 program always kills a module after it runs it. This removes it from your program's 64K process space. For example:

```
Run Xtest
Kill Xtest
```

You can also lessen the impact of the problem by merging a number of your short modules into one file. OS-9 then loads them all in one 8K block, assuming of course that their total length is less than 8K bytes. A series of commands like this will do the job:

```
chd /dd/cmds
merge gfx2 inkey syscall > gis
attr gis e pe
```

After you make the file gis, you can automatically load it into your CoCo's memory when you start OS-9. Once gis is loaded, gfx2, inkey, and syscall are ready for use at a moments notice. Don't overlook the command line attr gis e pe. If you don't run this command, you will not be able to load the gis file. Here's an alternate approach that many people take:

```
chd /dd/cmds
rename gfx2 temp
merge temp inkey syscall >gfx2
attr gfx2 e pe
```

This short review should help you sail past some common stumbling blocks on the path to OS-9 success.

Finally, I promised a holiday wish list for OS-9. So before we close, let's take a quick look at a few short lines of BASIC code that creates windows and menus and follow mice on another computer (see Figure 1).

Wouldn't something like this be nice? It sure would beat typing those long data TYPE definitions we have to deal with now. Maybe something like:

```
run gfx2("menu",windowname,1,Fil
es,8,4,menuname,Enable
```

or

```
run gfx2("button",ButtonNo,Butto
nLoc,Xsiz,Ysiz,On,Off)
```

While we're dreaming, wouldn't it be nice if we could put two or three windows on a screen and switch between them by simply clicking on them with a mouse? Or maybe we could move them around or change their size. Now that would be nice.

Stay tuned and we'll see what 1990 brings. That's it for December. Have a happy holiday season and a prosperous new year. See you in January for the first beginner's issue of a new decade!

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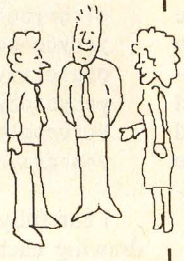

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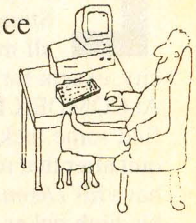

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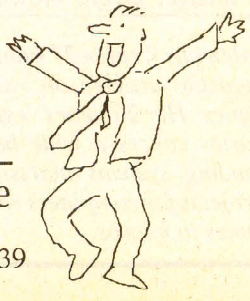

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Take a Gamble

by William Barden, Jr.
Contributing Editor

Even though I'm not much of a gambler, when they took away the penny slot machines on Main Street in Las Vegas, I cancelled all my future plans to visit that city, except for the COMDEX trade show. At COMDEX I'll buy a roll of nickels and find some nickel slot machines. I usually quit after that roll is gone. James Bond can have his *chemin de fer* and Amarillo Slim his high poker stakes. There is, though, a little bit of a gambler in all of us.

I'd like to show you the true guts of gambling — odds and luck. With a little computer magic on the CoCo you can simulate almost any gambling game without ever breaking a roll of pennies. But before throwing dice, shuffling cards and simulating slot machines, you should take a look at *random numbers* and *pseudo-random numbers.*

Random Thoughts

Suppose you have a single die (one of two dice) that has six faces numbered one to six. What are the odds that you'll throw a one? If the die is perfectly balanced, you'll throw any given number, one through six, about one of every six times. If you throw the die 60,000 times, the distribution is about 10,000 ones, 10,000 twos, 10,000 threes, 10,000 fours, etc.

Being a skeptic, I decided to throw a die to see for myself. Unfortunately I didn't have any dice, so I used M&M candies. M&Ms come in different colors so I selected six different-colored candies (red, yellow, orange, green, brown and light brown) and threw the rest into my mouth, supplementing the Twinkie I had eaten earlier. I put the six M&Ms into a paper cup. Then shaking the cup, I withdrew one without looking and recorded the color on the CoCo. I repeated the process for a total of 300 times. The sequence I came up with is as follows:

```
rrybybyrllogrbolooryyorggrobbl
golgbybbbgbgolgorgoryloorgblly
rgglborrorlrblogrbgrlgyrblobyo
rbobyllbboobgyollbbrrgyllrrbly
olrgrybgrrryggrggybrolgbrgoglr
yrryogoggylglrrglygyoyoyyglybb
ggglolyyybyoyogoolygrorrorbbyl
yooybrobybgbyyrrlrlrllglgrlorr
borgooglyblbbrybggyrbylygyrolo
yrorggoybbybobrrolbyglggyyylor
```

I carefully shook the cup before withdrawing each new M&M. There should have been an even or close number of reds, oranges, yellows, greens, browns and light browns, representing the numbers on a die.

I wrote a short BASIC program to count the colors and came up with 57 reds (die=1), 49 oranges (die=2), 51 yellows (die=3), 51 greens (die=4), 47 browns (die=5) and 45 light browns (die=6). These figures were close to an even distribution — a real set of random numbers!

On the average, distribution is about the same although not exactly evenly distributed on each turn. Figure 1 shows a plot of my 300 M&M selections. The number of times increases as you go to the right on the plot. The vertical scale represents the fraction of times each number appears, starting with red (1) on the top. Note that by the 300th selection, the fraction appears to converge to more of a straight line (see Figure 1).

Of course there is a chance that I could have selected all red M&Ms in the 300 selections. (One chance in six to the 300th power, which is about one chance in 28 followed by 234 zeroes!) If you consider shorter runs, however, the odds are much better. First of all — hear me now and believe me later — dice and M&Ms have no memory! If I select 10 red M&Ms in a row, the odds of my selecting another red M&M are one in six, the same as before.

Viewed after or before the fact, you can say that the odds of selecting three red M&Ms in a row are six to the third power, or one in 216. The odds of selecting 10 red M&Ms in a row are six to the 10th power, or one in 600,466,176. In other words, the odds of selecting the first red M&M are one in six. The odds of selecting the second red M&M are still one in six, making the odds of two red M&Ms in a row 1/6 x 1/6 or one in 36. The odds you will select three red M&Ms are 1/6 x 1/6 x 1/6 = one in 216, and so forth.

The CoCo and Random Numbers

I'm mentioning all of this as ground work before discussing the CoCo's ability to generate random numbers. Such random numbers can be used to simulate games and real-life situations, which we'll describe in a moment. As a matter of fact, books on the use of such random numbers have been published.

One way to generate random numbers on the CoCo is to shuffle a list of numbers very rapidly. Here's some code:

```
100 IF A=9 THEN A=0
110 A=A+1: IF INKEY$<>"" THEN PR
INT A: GOTO 100 ELSE GOTO 100
```

This short program continually loops and increments a variable from 1 to 9 and then restarts from 1 again. When I tried the program 73 times, I got 13 sevens, ten sixes, nine fives, eight ones, eight twos, eight fours, six threes, six nines and five eights. I believe over the long run you get a

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

fairly even distribution of ones through nines, although there's a built-in bias in the program when A=9 as the variable is reset to 0. This very probably results in a larger number of ones being generated. (Just change the A=9 to A=XXX to generate a larger range of numbers.)

Pseudo What?

Except for a few games, you can't sit at the CoCo pressing keys every time you want a random number. As a result, CoCo BASIC has a built-in random number generator. Actually it's a pseudo-random number generator (pseudo as in *false*). The numbers it generates are not really random at all but look like random numbers. If you know the algorithm, you can actually predict precisely what the next number will be, but the distribution of numbers resembles numbers picked at random by using paper cups full of M&Ms. In the following discussion I'll say *random* even though I really mean *pseudo-random*.

The command for random numbers in BASIC is RND(0) or RND(XXX). In the first format RND generates a pseudo-random number between 0 and 1. In the second format RND generates a pseudo-random number from 1 to XXX. Here are some examples:

```
100 PRINT RND(0)
110 GOTO 100

RUN
.315462959
.136370894
.654325616
.447284298
...

100 PRINT RND(10),
110 GOTO 100

RUN
2 1 8  6
6 3 10 9
8 5 2  10
```

Note that random numbers of the second type are more usable for most applications. Also the numbers generated in the second case are from 1 to the number specified in the parentheses of the RND() — in this case from 1 to 10.

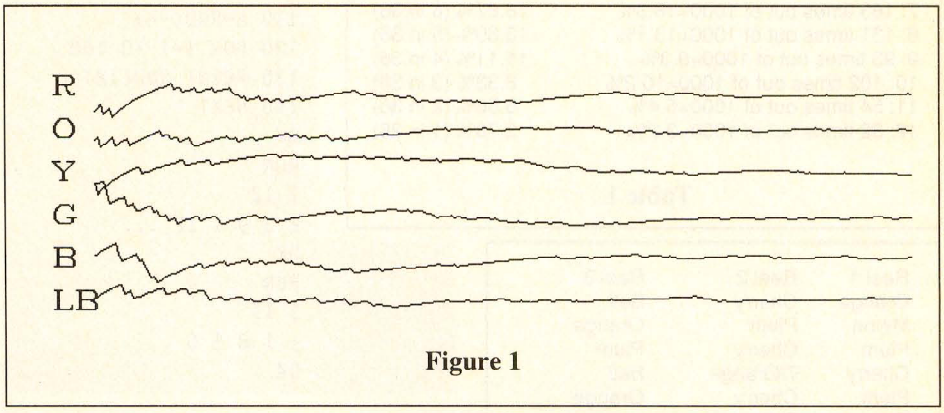

Figure 1

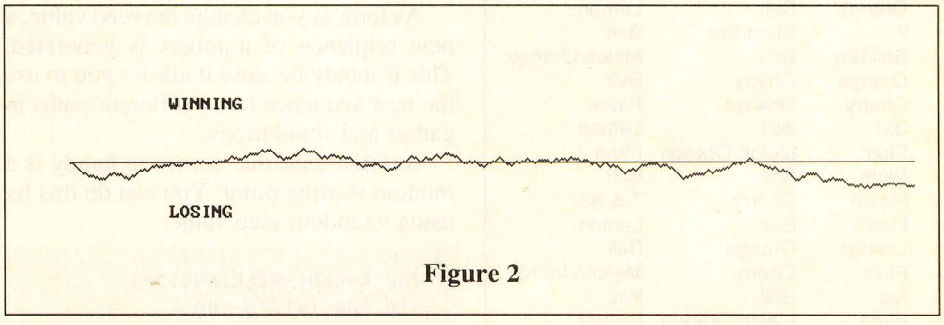

Figure 2

How Good Is RND?

Just how good is the distribution of numbers generated by RND? To test it we can use the program of Listing 1 to generate random numbers from 1 to 20 and count how many are generated after 10,000 times. The results are:

```
 10000
 493   529   513   494
 496   452   492   502
 561   518   522   517
 506   467   521   489
 471   501   497   459
```

The lowest count is 452, the highest count is 561 — a typical distribution. Although an ideal distribution of 1 through 20 is 500 counts for each, a deviation of 10 percent is not unusual. Don't forget that the distribution is continually changing. For example, in the code:

```
100 FOR I=1 TO 10000
110 PRINT RND(2)
120 NEXT
```

10,000 occurrences of the numbers 1 and 2 are produced. If you were to plot the occurrences of 1 and 2, you'd find that the random walk meandered back and forth across a line that represented an equal number of ones and twos many times during the 10,000 turns. In such a plotting program I came up with 28 such crossings over 10,000 random numbers (see Figure 2). The same thing happens with the generation of more than two numbers — the proportion of each number meanders back and forth across the even distribution line. This meandering represents a gambler's runs of good and bad luck.

Another element of good random number generation is the length of the sequence before any repetition occurs. All pseudo-random number generators repeat sooner or later. The random number generator in the CoCo, though, uses a four-byte number and probably generates about 2.1 billion numbers before a repeating sequence occurs. (I haven't tested this though.)

More About RND

A few more facts about RND and we'll be able to open up the RND function and see what it'll do. The RND function starts from the same seed value on power up or restart. The program:

```
100 FOR I=1 TO 100
110 PRINT RND(12)
120 NEXT
```

After 1000 tosses:	Actual odds:
2: 33 times out of 1000=3.3%	2.78% (1 in 36)
3: 48 times out of 1000=4.8%	5.56% (2 in 36)
4: 97 times out of 1000=9.7%	8.33% (3 in 36)
5: 108 times out of 1000=10.8%	11.11% (4 in 36)
6: 139 times out of 1000=13.9%	13.89% (5 in 36)
7: 163 times out of 1000=16.3%	16.67% (6 in 36)
8: 131 times out of 1000=13.1%	13.89% (5 in 36)
9: 93 times out of 1000=9.3%	11.11% (4 in 36)
10: 102 times out of 1000=10.2%	8.33% (3 in 36)
11: 54 times out of 1000=5.4%	5.56% (2 in 36)
12: 32 times out of 1000=3.2%	2.78% (1 in 36)

Table 1.

Reel 1	Reel 2	Reel 3
Orange	Cherry	Bell
Melon	Plum	Orange
Plum	Cherry	Plum
Cherry	7/Orange	Bell
Plum	Cherry	Orange
Orange	Bell	Lemon
7	Plum/Bar	Bell
Bell/Bar	Bell	Melon/Orange
Orange	Cherry	Bell
Cherry	Orange	Plum
Bar	Bell	Lemon
Plum	Melon/Orange	Plum
Plum	Bell	Bell
Melon	Cherry	7 & Bar
Plum	Bar	Lemon
Orange	Orange	Bell
Plum	Cherry	Melon/Orange
Bar	Bell	Bell
Plum	Melon/Orange	Lemon

Here are the payoffs:

Cherry	-	-	pay 2 coins
Cherry	Cherry	-	5
Orange	Orange	Bar	10
Orange	Orange	Orange	10
Plum	Plum	Bar	14
Plum	Plum	Plum	14
Bell	Bell	Bar	18
Bell	Bell	Bell	18
Melon	Melon	Bar	100
Melon	Melon	Melon	100
Bar	Bar	Bar	100
7	7	7	200

Table 2.

generates the same sequence of numbers — 6, 4, 2, 8, 6, 4, . . . — whenever the system is powered up (your system may have a different sequence, but it *will* be repeated). If an adventure game starts up with the same random numbers, you can memorize the sequence of actions. For this reason, RND allows you to reseed the random number generator by using a negative value in the RND statement. The program:

```
100 A=RND(-3)
110 FOR I=1 TO 100
120 PRINT RND(12),
130 NEXT
```

produces a new sequence of numbers based upon the -3 seed in the first RND statement. Changing this seed value produces new sequences:

```
100 INPUT A
110 A=RND(-A)
120 FOR I=1 TO 100
130 PRINT RND(12),
140 NEXT
OK
RUN
? 12
8 3 9 1 12 ...
OK
RUN
? 11
1 1 8 5 5 ...
OK
```

As long as you change the seed value, a new sequence of numbers is generated. This is handy because it allows you to use the new sequence to try different paths in games and simulations.

Another case that comes in handy is a random starting point. You can do this by using a random seed value:

```
100 A=RND(-PEEK(&H113))
110 FOR I=1 TO 100
120 PRINT RND(12)
130 NEXT
```

A new sequence is displayed each time the program is executed. The secret here is that the seed value is the contents of the lower-order byte of the TIMER variable used by BASIC in Location &H113. This value is incremented every 60th of a second. As long as the time between reseeds is not constant, a new sequence is generated for each program restart.

Using Random Numbers for Gambling

With a little knowledge about random number generation, it's easy to apply them to gambling simulations. I'll show you a few examples here.

Throwing Dice

The previous examples have been for one die, but throwing two dice is just as easy. Here's a short program that throws the dice for you:

```
100 D1=RND(6): D2=RND(6)
110 PRINT "THREW A"; D1; "AND A"
; D2; "TOTAL IS"; D1+D2
120 GOTO 100
```

This program displays the value of each die and the total points. After 1000 typical tosses the statistics are as shown in Table 1.

Card Games

A poker deck has 52 cards plus two jokers. Generating random numbers with cards is a little different than with dice because you draw from a pool of cards rather than rolling the dice each time. One way to handle this is to shuffle the cards by using an array of 54 entries. This technique is shown in the card shuffle program below, which is a subroutine you can use for your own card games or research:

```
100 ' DRIVER PROGRAM FOR SHUFFLE
110 GOSUB 10000
120 FOR I=1 TO 54
130 IF V$(I)="JOKER" THEN PRINT#
-2, "JOKER" ELSE PRINT#-2,
V$(I);" OF ";S$(I)
140 NEXT
150 STOP
10000 ' SHUFFLE A POKER DECK INT
O ARRAYS V,S,V$,S$
10010 DIM V(54),S(54),V$(54),S$(
54)
10020 FOR I=1 TO 54: V(I)=0: S(I
)=0:NEXT
10030 FOR I=1 TO 54
10040 VA=RND(54)+3
10050 FOR J=1 TO 54: IF V(J)=VA
THEN GOTO 10040 ELSE NEXT
10060 V(I)=VA
0070 PRINT ".";
10080 NEXT
10090 FOR I=1 TO 54
10100 IF V(I)>55 THEN GOTO 10130
10110 S(I)=(V(I) AND 3)
10120 V(I)=INT(V(I)/4)
10130 NEXT
10140 FOR I=1 TO 54
10150 IF V(I)>55 THEN V$(I)="JOK
ER": GOTO 10180 ELSE IF V(I)=1
THEN V$(I)="ACE":GOTO 10170
10160 IF V(I)<11 THEN V$(I)=STR$
(V(I)) ELSE IF V(I)=11 THEN
V$(I)="JACK" ELSE IF V(I)=12 THE
N V$(I)="QUEEN" ELSE
V$(I)="KING"
10170 IF S(I)=1 THEN S$(I)="CLUB
S" ELSE IF S(I)=2 THEN
S$(I)="HEARTS" ELSE IF S(I)=3 TH
EN S$(I)="SPADES" ELSE
S$(I)="DIAMONDS"
10180 NEXT
10190 RETURN
```

The program consists of two parts: a driver program that calls the card shuffle subroutine at Line 10000 and then prints results, and the shuffle subroutine itself.

The card shuffle subroutine shuffles a poker deck — 13 cards each of clubs,

Cherry	-	-	2	"C XXXX"
Cherry	Cherry	-	5	"C C XX"
Orange	Orange	Bar	10	"O O 7-"
Orange	Orange	Bar	10	"O XO7-"
Orange	Orange	Orange	10	"O O O "
Orange	Orange	Orange	10	"O XOO "
Orange	Orange	Orange	10	"O O XO"
Orange	Orange	Orange	10	"O XOXO"
Plum	Plum	Bar	14	"P PX7-"
Plum	Plum	Plum	14	"P PXP "
Bell	Bell	Bar	18	"B-B 7-"
Bell	Bell	Bell1	8	"B-B B "
Melon	Melon	Bar	100	"M MXX-"
Melon	Melon	Melon	100	"M MXMX"
Bar	Bar	Bar	100	"- - 7-"
Bar	Bar	Bar	100	"- X-7-"
Bar	Bar	Bar	100	"X— 7-"
Bar	Bar	Bar	100	"X-X-7-"
7	7	7	200	"7 7O7-"

Table 3.

hearts, spades and diamonds, plus two jokers. The results are in four arrays. Each array has entries numbered from 1 through 54. The V array holds the numeric value of each card, 1 through 13. The S array holds the numeric value for the suit, 0 for diamonds, 1 for clubs, 2 for hearts and 3 for spades. The V$ and S$ arrays hold the same results but in string form. V$ holds strings for ACE, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, JACK, QUEEN, KING and JOKER. S$ holds DIAMONDS, CLUBS, HEARTS and SPADES.

The subroutine takes about a minute to shuffle the cards and provides a good random deck. You might want to change the seed to give you a new sequence each time you use the program. Delete Line 10070 if you don't want to see a period displayed while each new card is shuffled.

The printout from the program above looks like this:

```
5 OF HEARTS
2 OF DIAMONDS
7 OF HEARTS
5 OF CLUBS
JACK OF CLUBS
QUEEN OF DIAMONDS
JOKER
...
```

Slot Machines

There is a wide variety of slot machines in use today, but even the ones with the best odds keep about 5.5 percent of what goes into them. In other words, if you have $100 in quarters and play a quarter slot, pulling the handle 10 times per minute, you'll lose about $.01375 per pull, giving you 7,272 pulls and 12 hours of gambling before the last quarter is gone! Just take a few extra bucks to buy that tube of Ben-Gay on your way home.

An excellent book on gambling odds, cheats, scams and con men is *Scarne's New Complete Guide to Gambling*. It's indispensable for computerized gambling games. According to Scarne a three-wheel nickel slot (which can still be found if you look hard enough) consists of symbols on each reel (see Table 2).

Scarne goes to some length to explain the odds — there are 7556 coins paid out of every 8000 coins used. With the information you have on RND, you can easily simulate a slot machine on your CoCo. I've left off the fancy graphics because I don't have room in this article — and besides that, doing so would take about 1100 hours of work. Instead I've used the following abbreviations :

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C	Cherry
O	Orange
B	Bell
M	Melon
P	Plum
7	Seven
L	Lemon
-	Bar
B-	Bell & Bar
7O	Seven & Orange
MO	Melon & Orange
P-	Plum & Bar
7-	Seven & Bar

Simulating the slot is really just a case of selecting three random numbers 1 through 20 like this:

```
170 R1=RND(20): R2=RND(20): R3=R
ND(20)
```

Once you've done that, you can convert the numeric value into the proper symbols for each reel. One way to do that is to keep three strings representing the 20 symbols per reel:

```
180 R1$="O M P C P O 7 B-O C - P
 O P M P O P - P "
190 R2$="C P C 7OC B P-B C O B M
OP B C - O C B MO"
200 R3$="B O P B O L B MOB P L B
 P B 7-L B MOB L "
```

Note that each of the 20 entries has one character and a space, or two characters.

The next step is to construct a single string representing reels 1 through 3. For example, if the random numbers were 8, 14 and 3, you'd have "B-B P ":

```
210F$=MID$(R1$,R1*2-1,2)+MID$(R2
$,R2*2-1,2)+MID$(R3$,R3*2-1,2)
```

You can now look at the final string to see if there are any payoffs. The payoffs and strings representing them are found in Table 3.

In these strings X stands for a "don't care" character. The payoff logic uses the final string in one horrendous bit of code:

```
230 PO=-1
240 IF MID$(F$,1,4)="C C " THEN
PO=5: GOTO 320
250 IF MID$(F$,1,2)="C " THEN PO
=2: GOTO 320
260 IF MID$(F$,1,2)="O " AND (MI
D$(F$,3,1)="O" OR
MID$(F$,4,1)="O") AND (MID$(F$,5
,1)="O" OR MID$(F$,6,1)="O"
OR MID$(F$,5,2)="7-") THEN PO=10
: GOTO 320
270 IF MID$(F$,1,3)="P P" AND (M
ID$(F$,5,2)="P " OR
MID$(F$,5,2)="7-") THEN PO=14: G
OTO 320
280 IF MID$(F$,1,4)="B-B " AND (
MID$(F$,5,2)="7-" OR
MID$(F$,5,2)="B ") THEN PO=18: G
OTO 320
290 IF MID$(F$,1,3)="M M" AND (M
ID$(F$,5,1)="M" OR
MID$(F$,6,1)="-") THEN PO=100: G
OTO 320
300 IF (MID$(F$,1,1)="-" OR MID$
(F$,2,1)="-") AND
(MID$(F$,3,1)="-" OR MID$(F$,4,1
)="-") AND MID$(F$,5,2)="7-"
THEN PO=100: GOTO 320
310 IF MID$(F$,1,6)="7 7O7-" THE
N PO=200: GOTO 320
```

This code logically implements the payoff table.

Finally some code is added to display the results. The complete program is shown in Listing 2. The format of the display is:

```
PRESS ANY KEY TO PULL LEVER
O P B
PAYOFF: -1
TOTAL COINS: 262
TOTAL PULLS: 15908
```

I changed the code slightly to play automatically, and after 15908 simulated pulls I was 262 coins ahead. During that time I had 1095 two-coin payoffs, 513 five-coin payoffs, 220 ten-coin payoffs, 132 fourteen-coin payoffs, 88 eighteen-coin payoffs, 33 100-coin jackpots, and two 200-coin super jackpots. This corresponds to the predicted payoffs of 1120, 480, 250, 168, 90, 36 and 2, based upon averaged combinations.

Other Simulations

Virtually any gambling game can be simulated on the CoCo. Of course when you get into the logic of two-player games, the rules for winning may become somewhat ill-defined and complicated. For example, it's easy enough to shuffle a deck of cards by computer but not as easy to implement an expert system that can beat Amarillo Slim at poker. However, now that you know some of the basics about random number generation, try some of your own simulations. They're a lot less expensive than dollar slots on the Las Vegas Strip.

See you next month with more CoCo topics! ❑

Listing 1: RANDOM

```
100 DIM N(20)
110 FOR I=1 TO 10000
120 N(0)=N(0)+1
130 RN=RND(20)
140 N(RN)=N(RN)+1
150 IF (I AND 255)=0 THEN PRINT
I
155 NEXT
160 PRINT
170 FOR I=0 TO 20
180 PRINT USING "#####"; N(I);
190 IF (I AND 3) = 0 THEN PRINT
200 NEXT
```

Listing 2: SLOTS

```
100 ' SLOT MACHINE
110 CT=0
120 TA=0
130 CLS
140 PRINT "PRESS ANY KEY TO PULL
 LEVER"
150 A$=INKEY$: IF A$="" THEN GOT
O 150
160 TC=TC+1
170 R1=RND(20): R2=RND(20): R3=R
ND(20)
180 R1$="O M P C P O 7 B-O C - P
 O P M P O P - P "
190 R2$="C P C 7OC B P-B C O B M
OP B C - O C B MO"
200 R3$="B O P B O L B MOB P L B
 P B 7-L B MOB L "
210 F$=MID$(R1$,R1*2-1,2)+MID$(R
2$,R2*2-1,2)+MID$(R3$,R3*2-1,2)
220 PRINT F$
230 PO=-1
240 IF MID$(F$,1,4)="C C " THEN
PO=5: GOTO 320
250 IF MID$(F$,1,2)="C " THEN PO
=2: GOTO 320
260 IF MID$(F$,1,2)="O " AND (MI
D$(F$,3,1)="O" OR MID$(F$,4,1)="
O") AND (MID$(F$,5,1)="O" OR MID
$(F$,6,1)="O" OR MID$(F$,5,2)="7
-") THEN PO=10: GOTO 320
270 IF MID$(F$,1,3)="P P" AND (M
ID$(F$,5,2)="P " OR MID$(F$,5,2)
="7-") THEN PO=14: GOTO 320
280 IF MID$(F$,1,4)="B-B " AND (
MID$(F$,5,2)="7-" OR MID$(F$,5,2
)="B ") THEN PO=18: GOTO 320
290 IF MID$(F$,1,3)="M M" AND (M
ID$(F$,5,1)="M" OR MID$(F$,6,1)=
"-") THEN PO=100: GOTO 320
300 IF (MID$(F$,1,1)="-" OR MID$
(F$,2,1)="-") AND (MID$(F$,3,1)=
"-" OR MID$(F$,4,1)="-") AND MID
$(F$,5,2)="7-" THEN PO=100: GOTO
 320
310 IF MID$(F$,1,6)="7 7O7-" THE
N PO=200: GOTO 320
320 PRINT "PAYOFF:";PO
330 TA=TA+PO
340 PRINT "TOTAL COINS:"; TA
350 PRINT "TOTAL PULLS:"; TC
360 PRINT
370 GOTO 140
```

Using arguments to get the job done

Printing the &#!*X& Unprintable

by Richard Ries

It happens all the time — you're going through some files to remove the ones you no longer need and you see one marked "temp." Wondering what's in there, you try to list it, only to watch as your screen goes crazy with funny characters and beeps, then freezes entirely. You've just tried to list a binary file.

`read` was written to alleviate this problem. Written in C and translated to BASIC09, it prints a file or series of files to the standard output. If, however, `read` finds an unprintable character, it replaces that character with a period. This makes `read` a member of a family of programs called *filters*.

Filter programs, like their namesakes in the real world, remove unwanted items — in this case, unprintable characters. `read` replaces the character with a period so you can see that the file isn't empty.

A Description of read.b

If you try to run a BASIC09 program without the proper number of arguments, you get an error. Because you don't know how many files will be listed, use a trick and send the list of programs as one argument and split them later. The parameter line is set to a length of 80 characters. The program reads through the list, separating names at each space character. It tries to open each file and, if successful, passes the path number to `File_Copy`. If it can't open a given file, `read.b` halts with an error message. When `File_Copy` is finished, `read.b` closes the file and if there are more names, goes on to the next in the list.

For its part, `File_Copy` reads a character from the path it was given, and if printable, it writes the character to the standard output. If the character is not printable, `File_Copy` prints a period instead. This continues until the end of the file is reached, at which point control returns to the calling program.

How read.c Works

When it comes to arguments, C does a much better job than BASIC09. All you do is tell the compiler to expect arguments and it does the rest. The argument count is placed into `argc`, and the arguments are stored in the `argv` array. Because C treats the program name as an argument (`argv[0]`), the argument count is one more than the number of arguments you pass. `read.c` tests the argument count, and if it is more than one, loops through the argument array, opening each file in order. If a file cannot be opened, an error message is printed and the program halts. After the file is opened, the path number is passed to the `File_Copy` function. Then the file is closed and the next file is listed.

Like its counterpart in `read.b`, `File_Copy` reads a character from the path and prints that character or a period to the standard output until the end of the file is reached. Control is then transferred to the calling program.

To make comparison of BASIC09 and C easier, similar operations have identical comments, indicated by Roman numerals. A note on translation: While a C compiler might possibly be fooled into converting a BASIC09 program into a C run-time module by using a lot of `#define` statements and writing some string-manipulating commands (such as `RIGHT$`), it would be awkward at best. Translating the other way, from C to BASIC09 is a problem — BASIC09 has nothing like C's preprocessor, which is

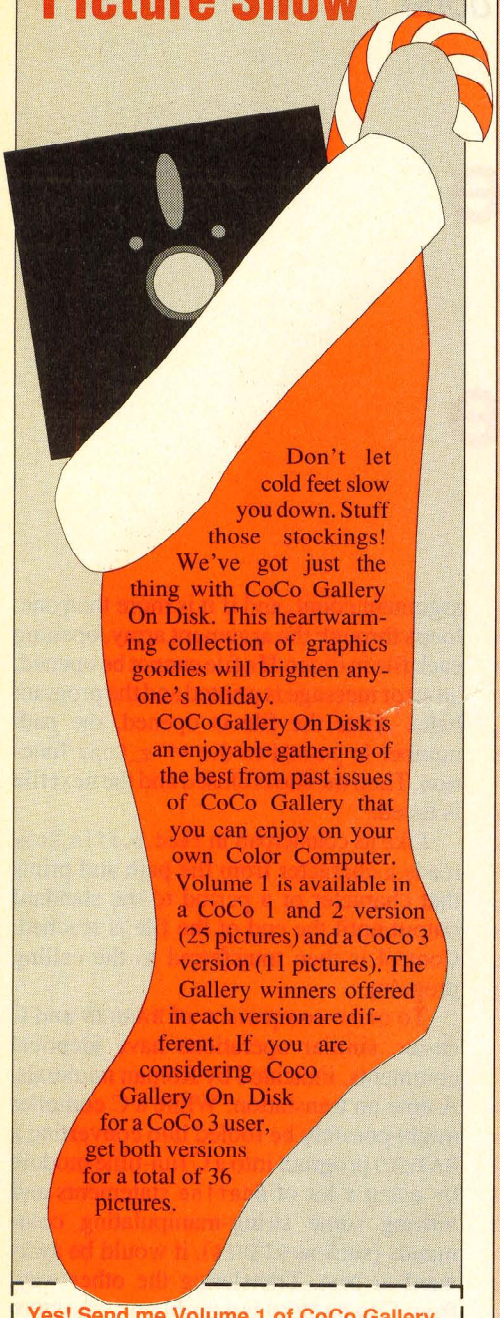
OS-9

Listing 1: `read.b`

```
PROCEDURE Read
0000        (* read.b -
000B        (*
000E        (* by R.J.Ries
001C        (* Copyright 1989 Falsoft, Inc.
003C
003D        PARAM Parm:STRING[80]
0049
004A        DIM FilePtr:INTEGER
0051        DIM EndPtr:INTEGER
0058        DIM STDIN:INTEGER
```

Richard Ries is an embedded systems programmer, working for a Long Island firm. His Delphi user name is RRIES; *his CompuServe user ID is 76057,3534. He can be contacted at 361 Deauville Blvd., Copiague, NY 11726.*

The CoCo Picture Show



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```
 005F       DIM STDERR:INTEGER
 0066       DIM FileName:STRING
 006D       DIM Ch:STRING[1]
 0079
 007A       EndPtr:=1
 0081       STDIN:=0
 0088       STDERR:=2
 008F
 0090       (* Parameter list splitting is done automatically in C *)
 00C9       WHILE EndPtr<=LEN(Parm) DO
 00D7         (* clear file name string *)
 00F3         FileName:=""
 00FA         (* get file name *)
 010D         FOR EndPtr=EndPtr TO LEN(Parm)
 0120           (* get a character *)
 0135           Ch:=MID$(Parm,EndPtr,1)
 0143           (* If it's a space, hop out of FOR loop*)
 016C         EXITIF Ch=" " THEN
 0179           (* Go to next name *)
 018F           WHILE MID$(Parm,EndPtr,1)=" " DO
 01A1             EndPtr:=EndPtr+1
 01AC           ENDWHILE
 01B0         ENDEXIT
 01B4           (* it's a character. add it to the file name *)
 01E3           FileName=FileName+Ch
 01EF         NEXT EndPtr
 01FA
 01FB         (* (II) file opening error. Hop out *)
 0221         ON ERROR GOTO 100
 0227         (* (I) open file for reading. *)
 0247         OPEN #FilePtr,FileName:READ
 0253         ON ERROR
 0256         (* All OK *)
 0262         RUN File_Copy(FilePtr)
 026C         (* (III) close file *)
 0282         CLOSE #FilePtr
 0288       ENDWHILE
 028C       END
 028E 100   (* fopen error *)
 02A2       PRINT #STDERR,"read: can't open file "; FileName
 02C5       END
 02C7

PROCEDURE File_Copy
 0000       (* (IV) copies the contents of a file pointed to *)
 0033       (* by filptr to stdout *)
 004C       PARAM FilePtr:INTEGER
 0053
 0054       DIM Ch:STRING[1]
 0060       DIM STDOUT:INTEGER
 0067
 0068       STDOUT:=1
 006F
 0070       (* (V) read a character until we get to file end *)
 00A3       WHILE NOT(EOF(#FilePtr)) DO
 00AE         (* get the character *)
 00C5         GET #FilePtr,Ch
 00CF       (* (VI) if the character is not a carriage return, and is unprintable,
*)
 0118         IF Ch<>CHR$($0D) THEN
 0126           IF Ch<" " OR Ch>"z" THEN
 013B             (* (VII) make it a period *)
 0157             Ch:="."
 015F           ENDIF
 0161         ENDIF
 0163         (* (VIII) print the character *)
 0183         PRINT Ch;
 0189       ENDWHILE
 018D       (* (IX) end file copy *)
 01A5       END
 01A7
```

Listing 2: `read.c`

```
/*
** read.c
**
** by R.J.Ries
** Copyright 1989 Falsoft, Inc.
*/


#include <stdio.h>

main(argc,argv)
int argc;
char *argv[];
{
FILE *FilePtr, *fopen();
```

```
 /* allow for multiple file names */
 while(--argc > 0)
  /* (I) open file for reading. */
  /* fopen will return 0 if it couldn't do it. */
  if((FilePtr=fopen(*++argv,"r"))==NULL)
   {
   /* (II) file opening error. Hop out */
   fprintf(stderr,"read: Can't open %s\n",*argv);
   exit(1);
   }
  else
   {
   /* All OK */
   File_Copy(FilePtr);
   /* (III) close file */
   fclose(FilePtr);
   }
  exit(0);
}

File_Copy(FilePtr)
FILE *FilePtr;
/* (IV) copies the contents of a file pointed */
/* to by FilePtr to stdout */
{
int Ch;

/* (V) read a character until we get to file end */
while(( Ch=getc(FilePtr))!=EOF)
 {
 /* (VI) if the character is not a carriage return, and is unprintable, */
 if( Ch != '\n')
   if( Ch<' ' || Ch>'z' )
     /* (VII) make it a period */
     Ch='.';
 /* (VIII) print the character */
 putchar(Ch);
 } /* end while */
}  /* (IX) end File_Copy */
```

what deals with `#define` statements. A translator must decide if the closing brace means `NEXT`, `ENDIF`, `ENDWHILE`, etc. What I did was write the C program, add comments, and then translate based mostly on the comments.

Getting It Going

The C version of `read` is run as:

`read` *file1 {file2 . . . filen}*

where the braces denote optional filenames.

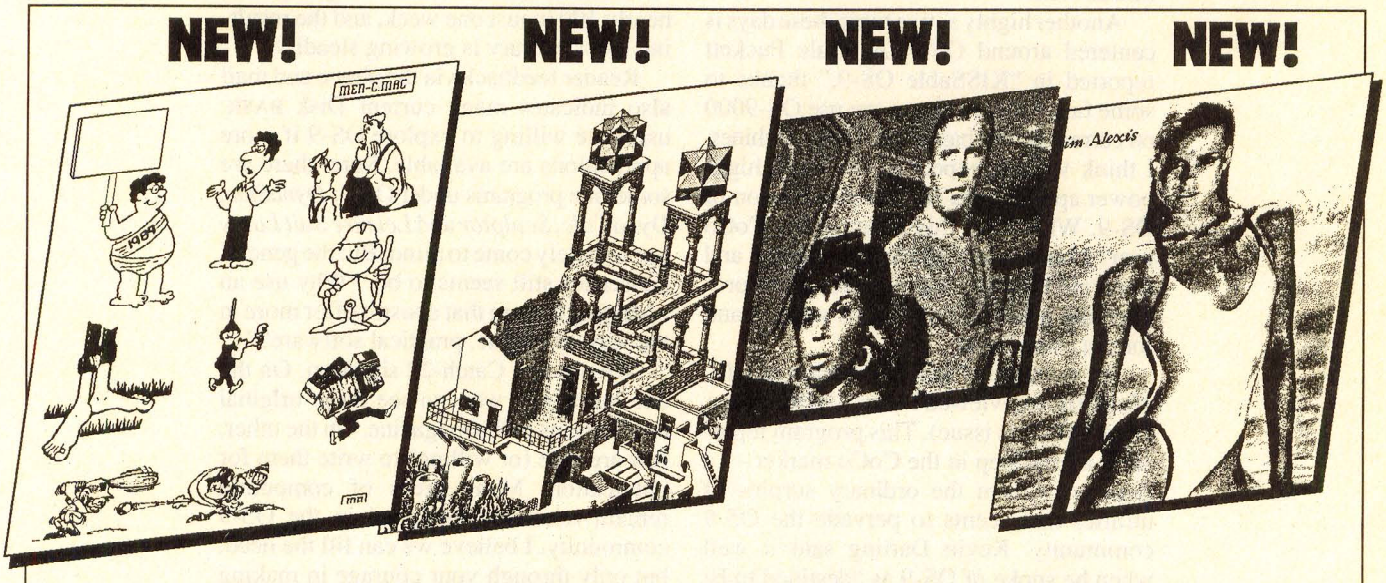
The BASIC09 version is run as:

`run read ("`*file1 {file2 . . . filen}*`")`

where the braces again denote optional filenames. In this case there can be no more than eighty characters, including spaces, in the list of files. If you've packed the program, it can be run from the prompt as:

`read ("`*file1 {file2 . . . filen}*`")`

with the same precautions as in the unpacked version. I hope this article will help you see some of the similarities and differences between C and BASIC09 more clearly.



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OS-9: Room for Growth

Hustle and bustle is the name of the game as I write this month's column — today is the day before RAINBOWfest and we are making final preparations for the show. Things would not be as hectic if THE RAINBOW weren't on deadline as well.

Another highly active topic these days is centered around OS-9. As Dale Puckett reported in "KISSable OS-9," thanks to some fancy footwork we can use OS-9000 on current 80386-based MS-DOS machines. I think we can expect to see some high-power applications for this progression of OS-9. What does this mean to the CoCo user? I hope it will spark new interest and motivate innovative programmers to produce the quality applications we demand for our computers.

An example of such a creation is *UltiMusE III*, (previewed in our MIDI Primer, Page 74 of this issue). This program represents a bold step in the CoCo market — a step away from the ordinary surplus of utilities that seems to pervade the OS-9 community. Kevin Darling said it well when he spoke of OS-9 as "destined to be married to the world of control systems operators and hobbyists."

Most of the software available for OS-9 falls under the utility/system programmer category. Indeed, we have relatively few OS-9 applications submissions in our files. Still, early returns from our reader survey (November 1989, Page 123) tell us you are hungry for OS-9 programs that perform useful functions not directly related to the computer. You want applications for business, finance, education, games, graphics and more.

To lend credence to these statements we again look to *UltiMusE*. The first version of this MIDI music editor was originally uploaded to the OS-9 SIG on Delphi. The download count for these files jumped to nearly 100 in just one week, and the resulting music library is growing steadily.

Reader feedback via the phone and mail also indicates many current Disk BASIC users are willing to explore OS-9 if more applications are available. Sure, there are some fine programs under OS-9; *DynaStar*, *DynaCalc*, *Sculptor* and *Leisure Suit Larry* immediately come to mind. But the general consensus still seems to be, "Why use an operating system that doesn't offer more in the way of unique, practical software?"

We are in a Catch-22 situation. On the one hand, you want to see these original applications in the magazine. On the other, few are able (or willing) to write them for publication. Many areas of computing remain relatively untapped in the OS-9 community. I believe we can fill the need, but only through your courage in making submissions — so go ahead and submit your ideas and programs. Let us know what you want and then give us the tools to work with. We don't mind the increased activity here in Prospect if it means serving you better.

— Cray Augsburg

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Pyramix

This fascinating CoCo 3 game continues to be one of our best sellers. ***Pyramix*** is 100% machine language written exclusively to take advantage of all the power in your 128K CoCo 3. The Colors are brilliant, the graphics sharp, the action fast. Written by Jordan Tsvetkoff and a product of ColorVenture.

The Freedom Series

Vocal Freedom

I've got to admit, this is one nifty computer program. ***Vocal Freedom*** turns your computer into a digital voice recorder. The **optional Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an **automatic message minder.** Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifier (RS cat. #277-1008) and any microphone.

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BASIC Freedom

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- Wellington — Dandy's/Radio Shack Dealer

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- Louisville — Hawley-Cooke Booksellers (2 Locations)

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- Lafayette — Oil Center Newsstand
- New Orleans — Bookstore; Oliver's Newsstand; Sidney's News Stand Uptown
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MARYLAND
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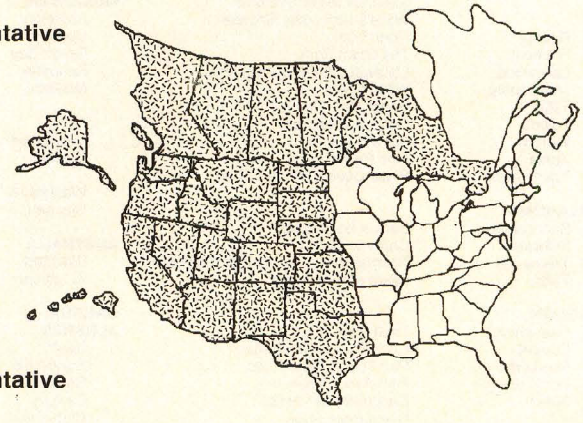

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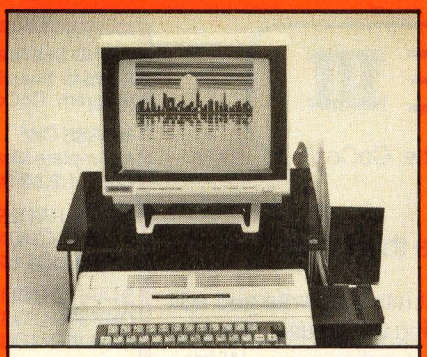

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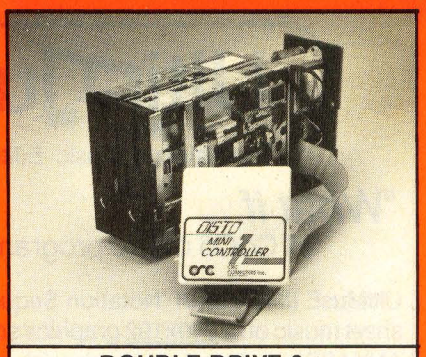

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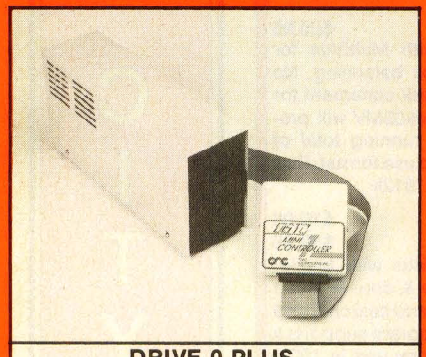

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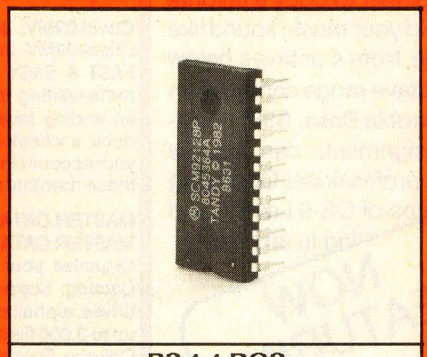

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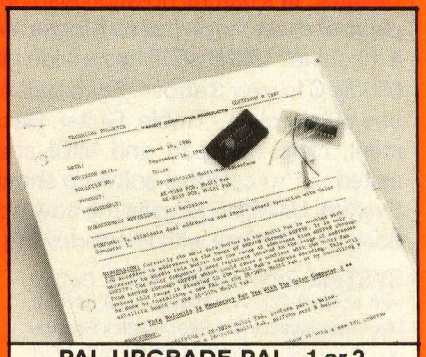

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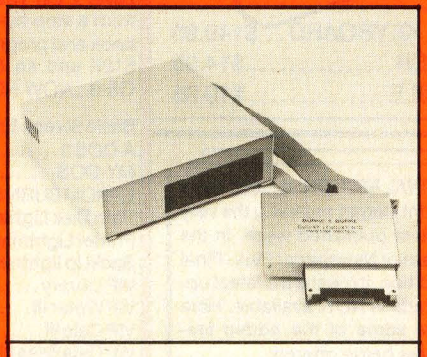

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See Rainbow Reviews 8/89

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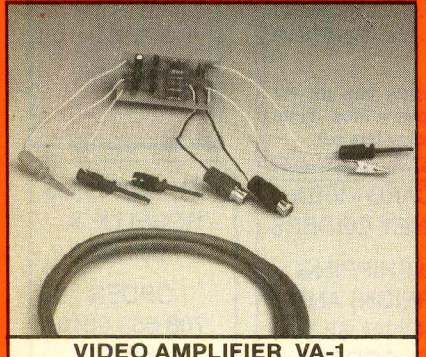

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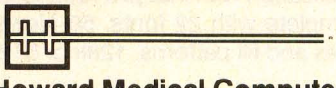

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Needs SP-C **$189** (5 ship)

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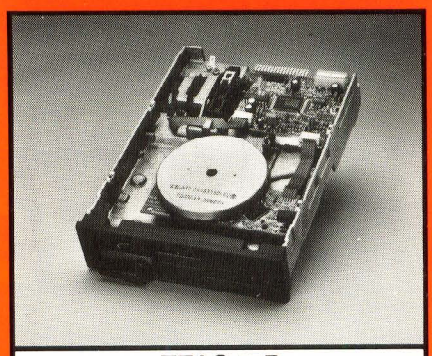
Too new for a picture, this freshly designed interface is the same size as the DISTO DC-3 Disk Controller. It fits directly into the CoCo expansion port and features three slots that allow packs like the DC-3, the Burke & Burke Hard Drive interface or the RS-232 pack. The MP-II draws it's power from the CoCo however, the B & B requires an optional AC power adapter. Designed by Chris Hawks.

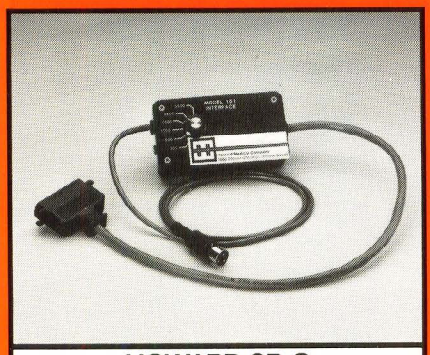
MP - II **$89.45**
AC Adapter AC - 9 **$14.95**



TEAC 55B

- 360K Double Sided Half Ht. Floppy
- Fits R.S. 501 & 502

CA-2 cable $29.50 **$98** (2 ship)



HOWARD SP-C

- Serial to Parallel Converter
- Connect CoCo to Parallel Printer

$68.45 (2 ship)

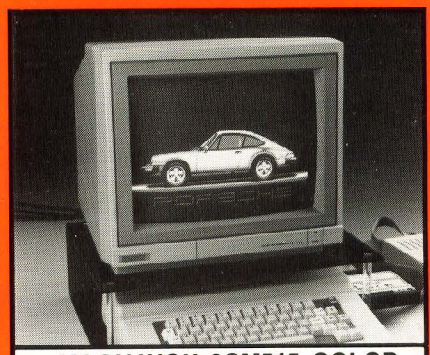
BURKE & BURKE BOX

Hard disk Interface	69.45
with clock	99.45
RSB ver 1.3	39.45
Hyper I/O ver 2.6C	29.95
XT-ROM ver 2.3	19.45
File repack	29.45

Dual Hi - Res Adapter

Combines joystick port, Radio Shack high resolution adapter, CoCo Max high resolution adapter into one unit with switches.

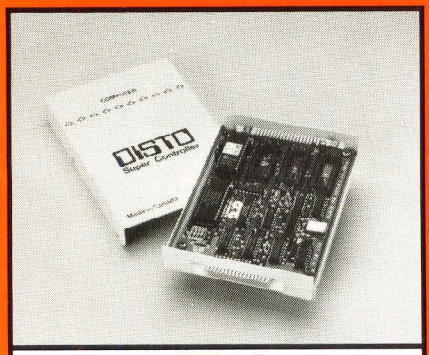
$39.45



MAGNAVOX 8CM515 COLOR

- 80 Column
- Use with Coco, Tandy 1000's, IBM PC

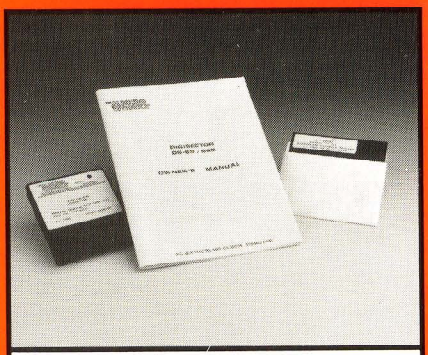
CC-3 RGB cable 19.95 **$259** (14 ship)



DISTO DC-3

- Original Disto Controller
- 2 ROM Slots; Gold Platted Contacts

$98 (2 ship)



MICRO WORKS DIGITIZER

- DS-69B 1.5 Second/Picture **$150**
- DS-69 B&W 2 Second/Picture **$100**

MEMORY

• 512K Bare Board	**$40**
• Populated 512K & Software	**$89**
• 64K 8 Chip for CoCo 2	**$30**

A. DISTO 3 in 1 Board	**$69.45**
B. DISTO MEB	$30.00
C. DISTO RS-232	$49.95

DISTO ADD ONS

MULTI BOARD ADAPTER	**$70**
EPROM PROGRAMMER	**$49**
DC-3C CLOCK CALENDAR PARALLEL PORT	**$40**

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